# What's Your PLAN?

2016

Fiscal Year Ended June 30

Comprehensive Annual Financial Report

MOSERS®

Missouri State Employees' Retirement System
A Component Unit of the State of Missouri

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2016

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Comprehensive Annual Financial Report


John Watson
*Executive Director*

Nick Mestres
*Chief Finance Officer*


MOSERS®

Missouri State Employees' Retirement System
A Component Unit of the State of Missouri

*Photos appearing in the CAFR were taken by MOSERS staff members Brooke Rowden, Sr. Marketing Technologist and Tracy Upschulte, Sr. Strategic Communications Analyst.*


MISSION
MOSERS exists to advance the financial security of its members.
VISION
We endeavor to:
Exceed customer expectations
Educate stakeholders
Ensure sound investment practices
Encourage responsible funding of the plan
through a commitment to
Excellence. Always.
VALUES
Quality • Respect • Integrity
Openness • Accountability

"At the time I began my employment, state government had a reputation for job security and good benefits. Twenty-five years later, the employee benefit package has proven to be one of the most valuable reasons for staying.

Additionally, I began participating in the deferred compensation plan 20+ years ago. I started saving after attending a deferred compensation seminar and understanding how the plan can work for everyone. When I was younger, I was under the illusion that you had to save millions to retire. Over the years, I learned that you don't have to be rich, but you do need to plan. Pay yourself first. Whether you deduct monthly from your paycheck or empty your pockets every night into a jar — just start saving something. Then don't touch it until you retire."

– *Tiffany*

*Missouri Veterans Commission (DPS)*

*"Pay yourself first. Whether you deduct monthly from your paycheck or empty your pockets every night into a jar — just start saving something."*

## Introductory Section


## Professional Awards

### Certificate of Achievement for Excellence in Financial Reporting

MOSERS' *Comprehensive Annual Financial Report* for the fiscal year ended June 30, 2015, was awarded the Certificate of Achievement for Excellence in Financial Reporting by the Government Finance Officers Association of the United States and Canada (GFOA). This was the 27th consecutive year that MOSERS has received this prestigious award. The Certificate of Achievement is the highest form of recognition for excellence in state and local government financial reporting. To be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized comprehensive annual financial report (CAFR). The CAFR must satisfy generally accepted accounting principles, applicable legal requirements, and GFOA reporting standards.

### Public Pension Standards Award

MOSERS received the Public Pension Standards Award from the Public Pension Coordinating Council (PPCC) in 2015, in recognition of meeting professional standards for plan design and administration as set forth in the Public Pension Standards. This award is presented by the PPCC, a confederation of the National Association of State Retirement Administrators (NASRA), the National Conference on Public Employee Retirement Systems (NCPERS), and the National Council on Teacher Retirement (NCTR).

## Letter of Transmittal

Missouri State Employees' Retirement System
Mailing Address: PO Box 209, Jefferson City, MO 65102-0209
Phone: (573) 632-6100 • (800) 827-1063 | Fax: (573) 632-6103
MO Relay: 7-1-1 (Voice) • (800) 735-2966 (TTY)
Website: *www.mosers.org* | Email: *mosers@mosers.org*
*Visit us at 907 Wildwood Drive, Jefferson City, MO*

MOSERS®
WE ARE HERE FOR YOUR BENEFIT.

October 14, 2016

The Board of Trustees
Missouri State Employees' Retirement System
907 Wildwood Drive
Jefferson City, MO 65109

Dear Board Members:

It is my pleasure to submit the 2016 *Comprehensive Annual Financial Report* (CAFR) of the Missouri State Employees' Retirement System (MOSERS). This CAFR is a presentation of the financial results for MOSERS within the specific time-frame of the last fiscal year. These financial results provide useful measurements for the evaluation of programs and represent a chronicle of plan status from one year to another. At MOSERS, a strong emphasis is placed on transparency. We believe the production of this report assists in that overall mission.

### Report Contents and Structure

This CAFR is designed to satisfy the reporting requirements of state law as stipulated in Sections 104.480, 104.1006, and 105.661 of the Revised Statutes of Missouri (RSMo), as amended. Management has prepared the basic financial statements of MOSERS and is responsible for the integrity and fairness of the information presented. Some amounts included in the financial statements and elsewhere may be based on estimates and judgments. These estimates and judgments were products of the best business practices available. The accounting policies followed in preparing the basic financial statements conform with U.S. generally accepted accounting principles. Financial information presented throughout the CAFR is consistent with that which is displayed in the basic audited financial statements.

Ultimate responsibility for the CAFR and the basic financial statements rests with the board of trustees. The executive director and the MOSERS staff assist board members in fulfilling their responsibilities. Systems of internal controls and supporting procedures are maintained to provide assurances that transactions are authorized, assets are safeguarded, and proper records are maintained. These controls include standards in the hiring and training of employees, the establishment of an organizational structure, and the communication of policies and guidelines throughout the organization. Internal controls are reviewed through internal audit programs and all internal audit reports are submitted to the board of trustees.

Williams-Keepers, LLC conducted an independent audit of the basic financial statements in accordance with U.S. generally accepted auditing standards. This audit is described in the *Independent Auditors' Report* on page 17 in the *Financial Section*. Management has provided the external auditors with full and unrestricted access to MOSERS' staff to discuss their audit and related findings, to facilitate independent validation of the integrity of the plan's financial reporting, and verify the adequacy of the internal controls in place.

The *Management Discussion and Analysis* in the *Financial Section* serves as an introduction to and overview of the financial statements. MOSERS is considered a component unit of the state of Missouri for financial reporting purposes and, as such, the financial statements in this report are also included in the *State of Missouri Comprehensive Annual Financial Report*.

### Profile of MOSERS

MOSERS is a body corporate and an instrumentality of the state of Missouri that was established in 1957 by state law, under the management of a board of trustees, for the purpose of providing retirement benefits to most state employees. MOSERS provides for those retirement benefits through pension trust funds, in keeping with the fiduciary responsibilities of the board members, staff, and certain outside service providers.

Subsequent to its creation, MOSERS was further assigned the task of providing most members of the retirement system with term life and long-term disability insurance. MOSERS maintains an internal service fund to account for the flow of funds related to this insurance and contracts with insurance companies to provide those benefits through insured defined

benefit plans. MOSERS maintains membership information on those eligible for the insurance coverage and collects and remits the premiums to the insurance company. Currently, the life and long-term disability insurance plans are insured through a third-party, The Standard insurance company, with oversight by MOSERS.

The State of Missouri Deferred Compensation Plan is accounted for as an internal service fund through a contractual relationship with ICMA-RC as the third-party record keeper with oversight by MOSERS. Investment options are made available to participants who retain responsibility for the investment of their individual accounts.

### Budgeting

The MOSERS Board of Trustees annually approves the administrative expense budgets for MOSERS' operations and investment departments. MOSERS' governance policy requires an exception report to the board of trustees by the executive director if expenses are expected to exceed budgeted amounts by 10% and to seek board approval in advance for any unscheduled salary increases or staff expansions not included in the budget approved by the board before the beginning of the fiscal year. There were no budget exceptions to report for the year.

### Personnel Changes

Over the 12-month period that was FY16, MOSERS experienced the retirement of long-term leadership and the selection of new staff to assume those roles. Gary Findlay, executive director, Karen Stohlgren, deputy executive director – operations and Rick Dahl, deputy executive director – investments retired in FY16 after long and distinguished careers. Mark Murphy was selected as deputy executive director – operations and Seth Kelly was selected as deputy executive director – investments. Turnover in FY16 was 15.1%, higher than experienced historically. Retirement of long-term employees contributed to increased turnover rates. In FY16, 13 employees resigned. This included six employees who retired. Currently, the average length of MOSERS' service for all employees is approximately 8.5 years and the average length of total state service for all MOSERS' employees is just over 13.4 years.

### Risk Management Enhancements

Risk management is a critical component of MOSERS' business activity. Our risk management consultant, Charlesworth & Associates, has opined that insurance coverage has been designed around the risks to which the system is exposed and the philosophy regarding funding of potential loss. Additionally, it is the consultant's opinion that "MOSERS continues to excel in risk management practices throughout the year." Our insurance risk management consultant helps ensure that the insurance coverage is consistent with industry standards and that MOSERS is receiving the best rates available.

### Project Management Office

At the November 2015 board meeting, a project manager position was approved and effective as of July 1, 2016. With this position filled, MOSERS has completed a critical step in the multi-year implementation of the new pension administration system. This new administration system will replace the current system that is almost three decades old. The process mapping conducted in FY16, as a team effort with the majority of MOSERS' staff, will be used by the vendor and our project management office to facilitate the new administration system and increase efficiency for staff and members over time.

### Deferred Compensation and College and University Retirement Plans

The MOSERS Board of Trustees is responsible for oversight of the State of Missouri Deferred Compensation Plan and the College and University Retirement Plan (CURP), which includes, but is not limited to, contracting with record keepers, plan administrators and investment managers, providing communications and ensuring that the plans are in compliance with federal and state law. Deferred compensation plan participation is voluntary for eligible members, including college and university employees.

As of June 30, 2016, there were 64,904 participants (39,744 active and 25,160 terminated/retired) in the State of Missouri Deferred Compensation Plan. Of all eligible employees (including public university employees), over 62% participate in the plan (up 1% from FY15). Of all eligible state employees, 73.6% participate in the plan (up 1.5% from FY15). Total participants (both active and terminated) increased by 2,863 during FY16. Plan assets total $1,866,004,878. ICMA-RC is the plan record keeper.

The plan investment options consist of 13 custom-designed target-date investment options, a stable income fund, a brokerage window option, the MIP Fund (offering participants the ability to purchase units of MOSERS' investment portfolio), and 26 closed legacy mutual fund options (consisting of a variety of domestic equity, international equity, fixed income, and lifestyle/balanced mutual funds) available only to plan participants that opted to remain invested in those funds as of May 1, 2009. Assets in the MIP as of June 30, 2016, total $4,693,919 held by 199 investors.

The board also has responsibility for oversight of the CURP, a mandatory 401(a) defined contribution plan for new education employees hired after June 30, 2002, by the regional colleges and universities that participate in MOSERS. The employer contribution rate (5.89% in FY16) is 1% less than the employer normal cost of the defined benefit plan for general state employees. TIAA-CREF is responsible for third-party administration and for providing investment products and education to plan members. Current plan assets total $67,805,615 with 2,656 participants (1,911 active and 745 terminated or retired).

### Cost Effectiveness Measurement

Customer service is a critical element in MOSERS' performance objectives. One of the ways MOSERS measures overall performance is through CEM Benchmarking, Inc. (CEM). CEM evaluated 55 leading pension systems, including systems in the United States, Canada, South Africa, Scandinavia, United Arab Emirates, and the Netherlands. MOSERS' peer group included nine U.S. public pension plans that are identified as the most relevant peer group based on membership size and system assets. This year, the CEM results indicated MOSERS' service ranked number one again in the peer group and the third highest in CEM's global universe. MOSERS' service score was 90, well above the peer median and average of 79.

CEM measures the cost of service on an annual per participant basis (including active members and benefit recipients). We have approximately 94,000 such participants while the median number within our peer group is approximately 155,000. Our cost of $80 per active member and annuitant was equal to the peer median and well below the peer average of $127. In addition, our overall complexity score remains below the peer median (with simplicity being viewed as a positive).

### Summary of Financial Information

The following schedule is a comparative summary of the pension trust funds' additions and deductions for the years ended June 30, 2016, and June 30, 2015.

***Pension Trust Funds***

| | Year Ended June 30, 2016 | Year Ended June 30, 2015 |
|---|---|---|
| Additions | $ 392,637,965 | $ 145,791,105 |
| Deductions | (798,926,575) | (767,712,413) |
| Net change | $(406,288,610) | $(621,921,308) |

The following schedule is a comparative summary of the revenues and expenses of the *Internal Service Funds* (insurance and deferred compensation activity) for the years ended June 30, 2016, and June 30, 2015.

***Internal Service Funds***

| | Year Ended June 30, 2016 | Year Ended June 30, 2015 |
|---|---|---|
| Operating revenues | $ 30,840,282 | $ 30,658,038 |
| Operating expenses | (31,375,740) | (31,138,744) |
| Nonoperating revenue | 18,777 | 12,549 |
| Net change | $ (516,681) | $ (468,157) |

Additional financial information can be found in the *Management Discussion and Analysis Report*, the financial statements, and schedules included in the *Financial Section* of this report.

### Investments

MOSERS' investments generated a time-weighted return of 0.3%, net of fees, for FY16. The total fund return trailed its policy benchmark by 7.1%. The five year annualized return of 5.6% produced a $252 million shortfall, net of fees, of the policy benchmark for that period. Additional information regarding the investments of the pension trust funds can be found in the *Investment Section* of this report.

### Plan Financial Condition/Funded Ratio

The financial statements are prepared in accordance with U.S. generally accepted accounting principles and do not affect the funding requirements for the defined benefit plan, which continue to be calculated based on annual actuarial valuations in conformity with generally accepted actuarial principles in accordance with the actuarial standards of practice issued by the Actuarial Standards Board and applicable statutes.

The funding objective of MOSERS' pension trust funds is to meet long-term benefit promises through contributions that remain approximately level as a percent of member payroll over decades of time. Historical information relating to progress in meeting this objective is presented in the *Employer Schedule of Funding Progress* on page 100. During the year ended

June 30, 2016, the actuarial funded ratio of the Missouri State Employees' Plan, which covers 114,864 participants, declined from 75.0% to 69.6%, primarily the result of the unfavorable investment market experience and assumption and method changes based on the 2011-2015 experience study. Funding of the Judicial Plan, which covers 975 participants, began on July 1, 1998. During the year ended June 30, 2016, the actuarial funded ratio of the Judicial Plan decreased from 27.8% to 26.2%. Additional information regarding the financial condition of the pension trust funds can be found in the *Actuarial Section* of this report.

### Awards

MOSERS was awarded the Certificate of Achievement for Excellence in Financial Reporting by the Government Finance Officers Association of the United States and Canada (GFOA) for its comprehensive annual financial report for the fiscal year ended June 30, 2015. This was the 27th consecutive year that MOSERS has received this prestigious award. In order to be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized comprehensive annual financial report. The report must satisfy generally accepted accounting principles and applicable legal requirements. A Certificate of Achievement is valid for a period of one year only. We believe that our current comprehensive annual financial report continues to meet the Certificate of Achievement Program's requirements and we are submitting it to the GFOA to determine its eligibility for another certificate.

MOSERS received the Public Pension Coordinating Council (PPCC), Public Pension Standards Award, in recognition of meeting the professional standards for plan design and administration as set forth in the Public Pension Standards. This award is presented by the PPCC, a confederation of the National Association of State Retirement Administrators (NASRA), the National Conference on Public Employee Retirement Systems (NCPERS), and the National Council on Teacher Retirement (NCTR).

These prestigious awards recognize MOSERS for financial and professional standards of excellence and are gratifying to MOSERS' staff. These notable awards can be viewed on page 5.

### Conclusion

This report is a product of the combined efforts of MOSERS' staff and advisors functioning under the board's leadership. It is intended to provide complete and reliable information that facilitates the management decision making process, serves as a means for determining compliance with legal requirements, and allows for the evaluation of responsible guardianship of system funds. MOSERS received an unmodified opinion from our independent auditor on the financial statements included in this report. The opinion of the independent auditor is on page 17.

Copies of this report are provided to the Governor, State Auditor, the Joint Committee on Public Employee Retirement of the General Assembly, and all state agencies that form the link between MOSERS and its members. Their cooperation contributes significantly to the success of MOSERS.

As the public pension arena continues to evolve, at MOSERS, we are placing a renewed emphasis on financial security in retirement. The average MOSERS retirement benefit is approximately $15,000 annually. Our goal is to motivate our members to realize the many components of income replacement in retirement that work in concert with MOSERS' benefit payments. We look forward to continuing the education of each and every member about the total retirement tools available to achieve financial security. It is our honor to work for this great state and to serve Missouri's public employees.

Respectfully submitted,

John Watson

John Watson
Executive Director

## Letter from the Board Chair

MOSERS
WE ARE HERE FOR YOUR BENEFIT.

**Missouri State Employees' Retirement System**
Mailing Address: PO Box 209, Jefferson City, MO 65102-0209
Phone: (573) 632-6100 • (800) 827-1063 | Fax: (573) 632-6103
MO Relay: 7-1-1 (Voice) • (800) 735-2966 (TTY)
Website: *www.mosers.org* | Email: *mosers@mosers.org*
*Visit us at 907 Wildwood Drive, Jefferson City, MO*

October 14, 2016

Dear Members:

On behalf of the board of trustees, I am pleased to present the MOSERS *Comprehensive Annual Financial Report* for the fiscal year ended June 30, 2016. While the focus of this report is on information related to the financial status of your retirement system, it also highlights other changes that occurred during the year. The *Financial Section* of this report is prepared in accordance with generally accepted accounting principles and includes financial statements that are appropriately attested to by the system's independent auditors.

MOSERS' investments generated a time-weighted return of 0.3% for FY16. The annualized return since the inception of maintaining investment return data (1981) has produced a long-term rate of return of 9.87%. After two consecutive double-digit returns in FY13 and FY14, this year marks the second consecutive year of returns not meeting investment return assumptions. The ongoing volatility of the financial markets continues to present challenges for investors across the industry.

During FY16, the MOSERS Board of Trustees authorized the performance of an actuarial experience study for the five-year period ending June 30, 2015. This study compares what was assumed to occur with what actually occurred relative to MOSERS during that five year time period. The board approved results from this endeavor included:

- Reduction of the investment return assumption from 8.0% to 7.65%, with the intentional reduction of 15 basis points annually over the next four years, resulting in an investment return assumption of 7.05%,
- Adoption of an increased time period to recognize plan gains and losses (from three to five years) relative to the actuarial value of assets, and
- Strengthened mortality tables to reflect potential increased lifespan of members.

It is the board's expectation these changes will assist in strengthening MOSERS' financial position and enhance the financial security of our members. The next experience study is scheduled for 2021 covering the five-year period ending June 30, 2020.

As an organization, MOSERS has encountered significant transitions over FY16. With the retirement of long-term leadership and the selection of new staff to assume those roles, MOSERS has been provided with the opportunity to learn, grow, and assimilate new approaches into current functions. I appreciate the new and current MOSERS staff and the business-as-usual approach that has been experienced over the last year. It is clear that MOSERS' member satisfaction continues to be paramount in the staff's daily endeavors.

The board experienced turnover this year. On behalf of the board and staff, I would like to thank Lori Neidel for her hard work while serving as a trustee to the system. One new trustee was added to the board this fiscal year. Joe Carmichael was appointed by Governor Nixon and has been an active contributor to the board thus far in his tenure. It is important to remember, trustees devote many hours in fulfilling their fiduciary duties and serve with no remuneration.

I wish to thank the board for their contributions this year as well as the staff for maintaining the high level of expertise and professionalism. I also wish to express my gratitude to you, our members, for your continued public service. Your dedication and commitment to Missouri citizens is greatly appreciated. If you ever have any questions, please contact us at MOSERS, P.O. Box 209, Jefferson City, Missouri 65102, call us at (800) 827-1063, or visit our website at *www.mosers.org*.

Sincerely,

Antwaun Smith

Antwaun Smith, Chair — Board of Trustees

## Board of Trustees


**Antwaun Smith - Chair**
*Governor Appointed Member*

**Representative Mike Leara - Vice Chair**
*House Appointed Member*

**Lloyd J. "Joe" Carmichael**
*Governor Appointed Member*

**Representative Caleb Jones**
*House Appointed Member*

**Senator Joe Keaveny**
*Senate Appointed Member*





**Don Martin**
*Elected Retired Member*

**Commissioner Doug Nelson**
**Office of Administration**
*Ex-Officio Member*

**Shannon Owens**
*Elected Active Member*

**Senator Wayne Wallingford**
*Senate Appointed Member*

**Crystal Wessing**
*Elected Active Member*

**State Treasurer Clint Zweifel**
*Ex-Officio Member*



## Administrative Organization

**John Watson**
*Executive Director*

- **Nick Mestres,** *Chief Finance Officer*
- **Jake McMahon,** *Chief Counsel*
- **Nicki Russell,** *Chief Auditor*
- **Ronda Stegmann,** *Legislative & Policy Coordinator*
- **Lisa Verslues,** *Human Resources Coordinator*

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**Mark J. Murphy**
*Deputy Executive Director — Operations*
*Chief Operations Officer (COO)*

- **Stacy Gillmore,** *Chief Technology Officer*
- **Lori Leeper,** *Board & Operations Projects Coordinator*
- **Pam Palmquist,** *Chief Benefits Officer*
- **Candy Smith,** *Communications & Strategic Planning Coordinator*

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**Seth Kelly**
*Deputy Executive Director — Investments*
*Chief Investment Officer (CIO)*

- **Shannon Davidson,** *Deputy CIO*
- **Omar Davis,** *Investment Legal & Compliance Counsel*
- **Chad Myhre,** *Manager - Liquid Alpha Strategies*
- **Scott Peppard,** *Manager - Illiquid Alpha Strategies*
- **Tyson Rehfeld,** *Manager - Global Rates & Credit*
- **Cindy Rehmeier,** *Manager - Defined Contribution Plans*

## About MOSERS

### Purpose

MOSERS was established September 1, 1957, and is governed by laws of the state of Missouri.

MOSERS provides retirement, survivor, and disability benefits, as well as life insurance and deferred compensation plan management to its members.

MOSERS administers retirement benefits for most state employees, including members of the Missouri General Assembly, elected state officials, and judges. MOSERS is responsible for administering the law in accordance with the expressed intent of the Missouri General Assembly and bears a fiduciary obligation to the state employees who are its members and beneficiaries.

### Administration

State law provides that responsibility for the administration of MOSERS is vested in an 11-member board of trustees. The board is comprised of:

- Two members of the Senate appointed by the President Pro Tem of the Senate.
- Two members of the House of Representatives appointed by the Speaker of the House.
- Two members appointed by the Governor.
- The State Treasurer.
- The Commissioner of Administration.
- Three other system members: two active members elected by the active and terminated-vested members, and one retiree elected by the retired members.

The day-to-day management of MOSERS is delegated to the executive director who is appointed by the board and serves at its pleasure. The executive director acts as advisor to the board on all matters pertaining to the system, contracts for professional services, and employs the remaining staff needed to manage the system.

### Organization
The executive director, chief operations officer (COO), chief finance officer (CFO) and chief investment officer (CIO) are responsible for planning, organizing, and administering the operations of the system under the broad policy guidance and direction of the board.

### Executive
The executive staff provide administrative support by assisting the executive director, COO, and CFO in the major legal, financial, operational, and oversight functions. Human resources, which includes oversight of general building maintenance, is also represented in this section.

MOSERS' office is divided into six administrative sections that perform specific functions for the system.

### Benefits
Staff in the benefits section are responsible for all member data, benefit verifications and inceptions, as well as contact with members regarding the benefit programs administered by MOSERS (retirement, life, and long-term disability insurance). They also conduct educational seminars in 16-plus cities around the state each year and host webinars to inform members about their MOSERS benefits.

### Communications
Communications staff are responsible for presenting information in clear and concise ways to facilitate effective, well-informed decision-making, planning, and action. They produce materials for members regarding the benefits administered by MOSERS including publications such as newsletters, handbooks, forms, brochures, and the annual report. Additionally, this team works in conjunction with information technology staff on electronic materials and tools such as the public, board, secure member, and internal websites. This section coordinates activities and processes for the organization that facilitate strategic thinking, planning, and implementation.

### Finance
The staff in this section are responsible for all financial records of the programs administered by MOSERS, including the preparation of financial and statistical reports and purchasing functions for MOSERS. They interface with the investment custodian, internal investment managers, Office of Administration accounting, state of Missouri employers, life insurance companies, actuaries, banks, and the IRS. They are also responsible for all billing, payment processing and balancing of member and employer contributions.

### Information Technology
The information technology section provides computer and technical design support for MOSERS' data processing activities. This team is responsible for developing and maintaining the automated systems that are used to administer benefits. They are also responsible for the document imaging system, network, unified communication system, and personal computers. Information technology and communications staff are jointly responsible for MOSERS' websites.

### Investments
The investments staff provides investment management and consulting services to the system. Primary functions include managing assets internally, selecting external managers for portions of the portfolio, researching and implementing portfolio allocation shifts and rebalancing, providing technical advice, serving as a liaison to the investment community, and informing and advising the board and executive director on financial, economic, and political developments which may affect the system. The investments staff works closely with external investment consultants, legal counsel and the executive director.

### Project Management
The responsibilities of staff in this area include benchmarking, business continuity preparation and planning, and business process mapping and analysis to identify process efficiencies and mitigate risk. They strive to deliver quality products to both internal and external stakeholders, and to provide a systematic examination and improvement of MOSERS' business processes to add value and improve the effectiveness, efficiencies, and adaptability of MOSERS' operations.

## Outside Professional Services

### Actuary
- Gabriel, Roeder, Smith & Co.

### Auditor
- Williams-Keepers, LLC

### Legal Counsel
- Thompson Coburn, LLP

### Master Custodian
- Bank of New York Mellon

### Investment Management Consultants
- Alliance Bernstein Defined Contribution Investments
  *Target Date Fund Consultant*
- Blackstone Alternative Asset Management, LP
  *Hedge Fund Asset Consultant*
- Cortex Applied Research, Inc.
  *Search Firm - Board Asset Adviser*
- Purrington Moody Weil, LLP
  *Trading Consultant*
- Summit Strategies Group
  *General Asset Consultant*
- TimberLink Consulting, LLC
  *Timberland Consultant*

### Risk Management Consultant
- Charlesworth & Associates, LC

### Third-Party Administrators
- ICMA-RC
  *Deferred Compensation Plan*
- The Standard
  *Disability and Life Insurance*
- TIAA-CREF
  *College & University Retirement Plan*

### Securities Lending Advisor
- Deutsche Bank AG, New York Branch

### Information Technology Consulting
- Avtex Solutions, Inc.
- DocSTAR
- Huber & Associates, Inc.
- HyperGen, Inc.

### Human Resources Consulting
- CBIZ Benefits & Insurance Service, Inc.

### Investment Risk Management
- MSCI BarraOne

### Investment Advisors
- Actis, LLP
- Aeolus Capital Management, Ltd.
- Alinda Capital Partners, LLC
- American Industrial Partners
- AQR Capital Management, LLC
- Axiom Asia Private Capital
- Axxon Group Private Capital Associates
- Bayview Asset Management, LLC
- BlackRock Financial Management, Inc.
- Blackstone Alternative Asset Management, LP
- Blackstone Real Estate Partners
- Blakeney Management, Ltd.
- Brevan Howard Capital Management, Ltd.
- Bridgepoint Capital, Ltd.
- Bridgewater Associates, LP
- Campbell Group
- CarVal Investors, LLC
- Castlelake
- Catalyst Capital Group, Inc.
- Catterton Partners

*Outside Professional Services continued on page 16*

*Outside Professional Services continued from page 15*

- Claren Road Asset Management, LLC
- Cornwall Capital Management, LP
- Davidson Kempner Capital Management, LLC
- DDJ Capital Management, LLC
- Development Partners International
- Diamondback Capital Management, LLC
- DRI Capital, Inc.
- EIG Global Energy Partners, LLC
- Elliott Management Corporation
- Empyrean Capital Partners, LP
- Eton Park Capital Management, LP
- Farallon Capital Management, LLC
- Gaoling Fund
- Glenview Capital Management, LLC
- Global Forest Partners, LP
- Harvest Fund Advisors, LLC
- HBK Capital Management, LP
- JLL Partners
- King Street Capital Management, LP
- Linden Capital Partners, LLC
- Mast Capital Management, LLC
- Merit Energy Company
- MHR Fund Management, LLC
- Millennium Technology Value Partners, LP
- Moon Capital Management, LP
- New Mountain Capital, LLC
- NISA Investment Advisors, LLC
- Oaktree Capital Management, LP
- Pacific Alternative Asset Management Company, LLC
- Perry Capital, LLC
- Pharo Global Advisors, Ltd.
- Resource Management Service, LLC
- Silchester International Investors
- Silver Creek Capital Management, LLC
- Silver Lake Management, LLC
- Silver Point Capital, LP
- SIR Capital Management, LP
- Siris Capital Group, LLC
- State Street Global Advisors
- StepStone Group
- Stone Harbor Investment Partners, LP
- TPG-Axon Management, LP
- Veritas Capital Fund Management, LLC
- Viking Global Investors, LP
- Visium Asset Management, LP
- Voya Investment Management
- Wellington Hedge Management Company, LLP

*Investment management, custodial and consulting fees can be found in the Schedule of Investment Manager Fees on page 82. Schedules of broker commissions can be found on page 86. Additional information on investment managers can also be found in the Investment Section of this report.*

"It was around my year anniversary with the state that I first started contributing to the deferred compensation program. Originally, my contribution amount was based on what I felt was reasonable and wouldn't create a hardship at the time. When I think about how saving for retirement will benefit me in the long term, I like the idea of having more financial freedom, less stress, and less worry when I retire — that's my driving force. I'd rather have money later (in retirement) than right now, and I don't miss the money I put into deferred comp.

My savings advice when it comes to retirement security and planning is to start now — it feels good to watch your money grow! Any amount is a good amount and it's easy to adjust, up or down, as needed. I firmly believe in beginning with the end in mind. Planning today will help tomorrow be easier when money may not be as available."

– *Kristi*

*Vocational Rehabilitation (DESE)*

*"My savings advice when it comes to retirement security and planning is to start now — it feels good to watch your money grow!"*

## Financial Section

## Independent Auditors' Report

WILLIAMS KEEPERS LLC
CERTIFIED PUBLIC ACCOUNTANTS & CONSULTANTS

2005 West Broadway, Suite 100, Columbia, MO 65203
OFFICE (573) 442-6171 FAX (573) 777-7800
3220 West Edgewood, Suite E, Jefferson City, MO 65109
OFFICE (573) 635-6196 FAX (573) 644-7240
www.williamskeepers.com

The Board of Trustees
Missouri State Employees' Retirement System

We have audited the accompanying financial statements of the pension trust and internal service funds of the Missouri State Employees' Retirement System (MOSERS), a component unit of the State of Missouri, as of and for the year ended June 30, 2016, and the related notes to the financial statements, which collectively comprise the MOSERS' basic financial statements as listed in the table of contents.

### Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with U.S. generally accepted accounting principles; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

### Auditors' Responsibility

Our responsibility is to express opinions on these financial statements based on our audit. We conducted our audit in accordance with U.S. generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

### Opinions

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of the pension trust and internal service funds of MOSERS as of June 30, 2016, and the respective changes in financial position and, where applicable, cash flows thereof for the year then ended in conformity with U.S. generally accepted accounting principles.

### Other Matters

#### Required Supplementary Information

U.S. generally accepted accounting principles require that the *Management's Discussion and Analysis* on pages 19-23 and the *Schedule of Changes in Employers' Net Pension Liability*, *Schedule of Employer Contributions, Schedule of Annual Money-Weighted Rate of Return on Investments,* and the *Notes to the Schedules of Required Supplementary Information* on pages 52-58 be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context.

We have applied certain limited procedures to the required supplementary information in accordance with U.S. generally accepted auditing standards, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

**Other Information**

Our audit was conducted for the purpose of forming opinions on the financial statements that collectively comprise MOSERS' basic financial statements. The *Introductory*, *Investment*, *Actuarial,* and *Statistical Sections* and the additional information on pages 59-66 are presented for purposes of additional analysis and are not a required part of the financial statements.

The additional information on pages 59-66 is the responsibility of management and was derived from and relate directly to the underlying accounting and other records used to prepare the financial statements. Such information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with U.S. generally accepted auditing standards. In our opinion, the additional information on pages 59-66 is fairly stated in all material respects in relation to the basic financial statements as a whole.

The *Introductory*, *Investment*, *Actuarial,* and *Statistical Sections* have not been subjected to the auditing procedures applied in the audit of the basic financial statements and, accordingly, we do not express an opinion or provide any assurance on them.

Williams-Keepers LLC

October 14, 2016

## Management Discussion and Analysis

This discussion and analysis of the Missouri State Employees' Retirement System (MOSERS) provides an overview of the retirement system's financial activities for the fiscal year ended June 30, 2016. It is intended to be used in conjunction with the *Transmittal Letter* beginning on page 6 and *Financial Statements* and *Notes*, on pages 24-51 of this report.

### Using This Financial Report

This Comprehensive Annual Financial Report (CAFR) reflects the activities of MOSERS as reported in the *Statements of Fiduciary Net Position* and the *Statements of Changes in Fiduciary Net Position*, which begin on page 24. These statements are presented on an accrual basis and reflect all trust fund activities as incurred. The *Notes to Financial Statements* are an integral part of the financial statements and include additional information not readily evident in the statements themselves. The *Required Supplementary Information* (RSI) and *Additional Financial Information* following the *Notes to Financial Statements* provide historical information and additional details considered useful in evaluating the condition of the plan. Investment data in the *Financial Section* is presented at fair value. See the *Actuarial Section* of this report for a detailed discussion of the actuarial value of assets and liabilities and the funded status.

The basic financial statements contained in this section of the CAFR consist of:

- The *Statements of Fiduciary Net Position* which report the pension trust funds' assets, liabilities, and resulting net position where Assets – Liabilities = Net Position held in trust for pension benefits available at the end of the fiscal year. It is a snapshot of the financial position of the pension trust funds at that specific point in time.
- The *Statements of Changes in Fiduciary Net Position* which summarize the pension trust funds' financial transactions that have occurred during the fiscal year where Additions – Deductions = Net Change in Net Position. It supports the change that has occurred to the prior year's net position on the *Statements of Fiduciary Net Position*.
- The *Statements of Net Position* of the internal service funds is similar to the *Statements of Fiduciary Net Position* in that it is also a snapshot of the financial position of the internal service funds where Net Position + Liabilities = Assets.
- The *Statements of Revenues, Expenses, and Changes in Net Position* of the internal service funds is similar to the *Statements of Changes in Fiduciary Net Position* in that it also reports a summary of the financial activity that occurred over the period of the fiscal year where Revenues – Expenses = Net Revenue and supports the change to the prior year's net position.
- The *Statements of Cash Flows* of the internal service funds report the financial transactions of the fiscal year of the internal service funds on a cash basis. It is similar to the *Statements of Revenues, Expenses and Changes in Net Position*; however, the focus of this statement is on the change to cash balances with accrued income and expense items eliminated.
- The *Notes to the Financial Statements* are an integral part of the above financial statements and include additional information not readily evident in the statements themselves.
- The required supplementary *Management Discussion and Analysis* information, the *Required Supplementary Information*, and *Additional Financial Information* following the *Notes to the Financial Statements* provide detailed historical information considered useful in evaluating the condition of the plans administered by MOSERS.
- The MSEP experienced a decrease in its actuarial funded status from 75.0% to 69.6% and the Judicial Plan experienced a decrease in its actuarial funded status from 27.8% to 26.2%. In June 2016, the board voted to reduce the nominal assumed investment return from 8% to 7.65%. Wage inflation returned from a temporary 0% assumption to 3.0% and price inflation was unchanged at 2.5%. In June 2013, the board approved a change to reduce the amortization period from an open 30 years to a closed 30 years beginning July 1, 2014, and will be reduced by one year for each subsequent annual valuation until the period reaches one year. This amortization period will be re-examined in conjunction with the 2030 actuarial valuation to determine if it should be reduced below 15 years or changed to an open 15 years.
- Also at the June 2016 meeting, the board approved a change related to the smoothing method to determine the actuarial value of assets using the investment gains or losses, relative to what would have been earned at the assumed rate on the actuarial value of assets, and combine that amount with any previously unrecognized investment gains or losses. One-fifth of that total amount would then be recognized in the current year with four-fifths deferred for future recognition. In no event would the actuarial value of assets as of the valuation date be more than 125% or less than 80% of the fair value of assets.

### Financial Reporting Highlights

- MOSERS' net position restricted for pensions decreased by $406.3 million during fiscal year 2016 (FY16). On June 30, 2016, total plan assets (including net capital assets of $3.5 million) were $11.9 billion, exceeding total liabilities of $3.7 billion, resulting in a net position held in trust for pension benefits of $8.2 billion.
- Covered payroll, from which both employee and employer contributions are calculated, increased $3.0 million for the Missouri State Employees' Plan (MSEP) and $1.7 million for the Judicial Plan, or .16% and 3.1% respectively, over the last fiscal year.
- Total contributions for FY16 were $390.9 million, up from $386.5 million in FY15. During FY16, contribution rates were 16.97% for the MSEP and 58.45% for the Judicial Plan, which is the rate determined by the June 30, 2013 actuarial valuation. Although not prohibited to increase, future contribution rates shall not be reduced below these rates until the actuarial funding ratio of the plans are at least 80%. MOSERS will continue to use a funding policy that follows a financing pattern which computes and requires contribution amounts (when expressed as a percentage of active member payroll) to remain approximately level from year to year and from one generation of citizens to the next generation.
- Investment and securities lending income, net of related fees was $1.2 million. Investments of the pension trust funds generated a time-weighted 0.3% return, net of fees, for the year, up from the prior year's return of (2.64)%. The money-weighted rate of return, net of investment expenses as defined by GASB 67 was 0.08% for FY16.
- Investment activity expenses were $79.1 million in FY16 down from $124.1 million in FY15. This decrease is due to less incentive and management fees paid to investment managers, which is related closely to the performance of the funds they manage.
- Benefit payments to members increased by $28.2 million and service transfers and refunds increased by $2.6 million for FY16.
- Administrative expenses totaled $8.6 million in FY16, compared to $8.2 million in FY15.
- The internal service fund's net position decreased by $0.5 million. The decrease is due to reimbursement from the State of Missouri Deferred Compensation Plan's third party record keeper to cover administrative expenses occurring in a previous year, which covered FY16 and future years.

The following schedules present *Summary Comparative Financial Statements* of the pension trust funds and internal service funds for FY16 and FY15. For each schedule there is a brief summary of the significant changes noted in those schedules.

*Pension Trust Funds*

### Summary Comparative Statements of Fiduciary Net Position

The largest components of the net position of the pension trust funds are the investments, cash and short-term investments, obligations under repo agreements, and securities lending collateral.

FY16 experienced a decrease in the net fair value of investments (total investments less obligations under repo agreements) of $308 million, from $6.1 billion in FY15 to $5.7 billion in FY16, primarily attributable to benefit payment obligations exceeding investment returns as evidenced by MOSERS' total investment return, net of fees, of 0.3% this year. Detailed information regarding MOSERS' investment portfolio is included in the *Investment Section* of this report.

Obligations under repo agreements decreased from $4.2 billion in FY15 to $3.6 billion in FY16 due to decreased exposure financed with reverse repos.

Cash and short-term investments increased due to multiple factors including the performance of the fund, the timing of investment funding and obligations under derivative investments and reverse repo agreements.

Investment sales receivable decreased as a result of the timing of investment purchases.

The decrease in securities lending collateral is primarily attributable to a lower utilization rate of lendable assets in the lending portfolio at fiscal year-end. As of fiscal year-end, approximately 0.15% of the collateral received has been invested in asset-backed bonds, down from 0.20% the prior year. The invested collateral was $0.7 million below the liability at the end of FY15 and FY16.

*Pension Trust Funds*

**Summary Comparative Statements of Fiduciary Net Position**

| | As of June 30, 2016 | As of June 30, 2015 | Amount of Change | Percentage Change |
|---|---|---|---|---|
| Cash and short-term investments | $ 2,454,419,406 | $ 2,237,194,552 | $ 217,224,854 | 9.71% |
| Receivables | 89,911,461 | 373,465,032 | (283,553,571) | (75.93) |
| Investments | 9,349,306,746 | 10,258,761,342 | (909,454,596) | (8.87) |
| Invested securities lending collateral | 14,258,587 | 19,228,051 | (4,969,464) | (25.84) |
| Net capital assets | 3,541,901 | 3,701,791 | (159,890) | (4.32) |
| Other assets | 68,128 | 26,425 | 41,703 | 157.82 |
| **Total assets** | 11,911,506,229 | 12,892,377,193 | (980,870,964) | (7.61) |
| Administrative expense payables | 2,419,569 | 1,399,712 | 1,019,857 | 72.86 |
| Investment purchase payables | 36,690,153 | 1,598,102 | 35,092,051 | 2,195.86 |
| Securities lending collateral | 14,940,141 | 19,918,342 | (4,978,201) | (24.99) |
| Other liabilities | 10,083,285 | 14,257,651 | (4,174,366) | (29.28) |
| Obligations under repo agreements | 3,601,461,597 | 4,203,408,628 | (601,947,031) | (14.32) |
| MOSERS investment portfolio liability (MIP) | 4,693,919 | 4,288,583 | 405,336 | 9.45 |
| **Total liabilities** | 3,670,288,664 | 4,244,871,018 | (574,582,354) | (13.54) |
| **Net positions restricted for pensions** | $ 8,241,217,565 | $ 8,647,506,175 | $(406,288,610) | (4.70) |

## Summary Comparative Statements of Changes in Fiduciary Net Position

The increase in contributions received is primarily attributable to an increase in covered payroll from FY15 to FY16.

The increase in investment income from FY15 to FY16 is attributable to a slight improvement in market conditions experienced by the investments of the fund. The decrease in securities lending income is primarily due to less lendable assets in the lending portfolio during the fiscal year. Margins continue to be low, resulting in low income generation. The *Investment Section* of this report contains additional information regarding investments and securities lending activity.

The total benefit payments increased as a result of an increase in the number of benefit recipients plus cost-of-living adjustments provided to existing benefit recipients. Detailed schedules of these changes can be viewed on pages 104-109 of the *Actuarial Section* of this report.

Service transfers increased $1.3 million in FY16 and are dependent on the number of members electing to transfer their service out of MOSERS. Refunds of employee contributions are the result of the number of members of the MSEP 2011 tier who have terminated employment and are eligible to request a refund, as well as members employed prior to September 1, 1972 who have contributions remaining in the system. Refunds increased in FY16 by $1.3 million due to a larger number of terminated nonvested MSEP 2011 members choosing to receive a refund.

*Pension Trust Funds*

**Summary Comparative Statements of Changes in Fiduciary Net Position**

| | Year Ended June 30, 2016 | Year Ended June 30, 2015 | Amount of Change | Percentage Change |
|---|---|---|---|---|
| Contributions | $ 390,869,615 | $ 386,471,986 | $ 4,397,629 | 1.14% |
| Investment income (loss) – investing activities | 1,213,744 | (241,338,203) | 242,551,947 | 100.50 |
| Investment (loss) income – securities lending activities | (49) | 116,204 | (116,253) | (100.04) |
| Miscellaneous income | 554,655 | 541,118 | 13,537 | 2.50 |
| **Total additions** | 392,637,965 | 145,791,105 | 246,846,860 | 169.32 |
| Benefits | 783,420,118 | 755,239,947 | 28,180,171 | 3.73 |
| Service transfers and refunds | 6,880,099 | 4,271,759 | 2,608,340 | 61.06 |
| Administrative expenses | 8,626,358 | 8,200,707 | 425,651 | 5.19 |
| **Total deductions** | 798,926,575 | 767,712,413 | 31,214,162 | 4.07 |
| **Net (decrease) increase** | (406,288,610) | (621,921,308) | 215,632,698 | 34.67 |
| **Net positions beginning of year** | 8,647,506,175 | 9,269,427,483 | (621,921,308) | (6.71) |
| **Net positions restricted for pensions** | $8,241,217,565 | $8,647,506,175 | $(406,288,610) | (4.70) |

*Internal Service Funds*

### Summary Comparative Statements of Net Position Analysis

The decrease in premiums receivable is attributable to normal fluctuations in the month-end balance of life and long-term disability insurance premiums receivable during the year, which are dependent on the number of members participating and amount of their coverage.

The decrease in investments is attributable to reimbursement from the State of Missouri Deferred Compensation Plan's third-party record keeper to cover administrative expenses occurring in a previous year, which covered FY16 and future years.

The increase in premiums payable is attributable to normal fluctuations in the month-end balances of premiums payable for the year, similar to the fluctuations of the premiums receivable.

Other liabilities decreased primarily as a result of the timing of reimbursements due to the pension trust funds for the internal service fund's portion of shared expenses which had not been transferred at year end.

### Summary Comparative Statements of Revenues, Expenses, and Changes in Net Position Analysis

Premium receipts and premium disbursements increased slightly due to normal fluctuations in the amount of optional life insurance coverage selected by state employees. These amounts are collected when employee wages are paid and remitted to The Standard insurance company on a monthly basis.

Deferred compensation receipts and disbursements were $0 for both FY15 and FY16. This is attributable to a $1 million reimbursement paid in FY14 to cover administrative expenses to the internal service fund at MOSERS from the State of Missouri Deferred Compensation Plan's third-party record keeper which collects deferred compensation contributions directly from employers. As of June 30, 2016, there were 64,904 participants (both active and terminated/retired), which is an increase of 2,863 from FY15. The state of Missouri has not contributed an employer match since March 2010.

Administrative expenses increased primarily as a result of personnel services allocated to Life and LTD *Internal Service Funds*, and an increase in personnel services directly related to the Deferred Compensation *Internal Service Funds*.

### Summary Comparative Statements of Cash Flows Analysis

The decrease in cash flows from operating activities is primarily attributable to an increase in cash payments paid to outside carriers over that of FY15 of $.5 million and an increase for payments to employees for services of $.5 million, which are partially offset by an increase in payments received from employers and members of $.2 million.

The increase in cash flows from noncapital financing activities is primarily attributable to an increase in the amount of life and long-term disability premium refund checks that remained outstanding at year end.

The increase in cash flows from investing activities is attributable to several factors including the decrease in outflows for net purchase and maturities of overnight repurchase agreements of $.5 million.

### Request for Information

This financial report is designed to provide a general overview of the system's finances for all those interested in the system. Questions concerning any of the information provided in this report or request for additional information should be addressed to MOSERS at P.O. Box 209, Jefferson City, MO 65102 or by email at *mosers@mosers.org*.

*Internal Service Funds*

**Summary Comparative Statements of Net Position**

| | As of June 30, 2016 | As of June 30, 2015 | Amount of Change | Percentage Change |
|---|---|---|---|---|
| Premiums receivable | $ 962,006 | $ 978,693 | $ (16,687) | (1.71)% |
| Investments | 3,935,042 | 4,482,083 | (547,041) | (12.21) |
| Fixed assets net of accumulated depreciation | 3,946 | 4,437 | (491) | (11.07) |
| Leasehold improvements | 1,940 | 2,910 | (970) | (33.33) |
| **Total assets** | $4,902,934 | $5,468,123 | $(565,189) | (10.34) |
| Premiums payable | $4,550,931 | $4,394,941 | $ 155,990 | 3.55 |
| Other liabilities | 123,378 | 327,876 | (204,498) | (62.37) |
| **Total liabilities** | 4,674,309 | 4,722,817 | (48,508) | (1.03) |
| **Unrestricted net position** | 228,625 | 745,306 | (516,681) | (69.32) |
| **Total liabilities and net position** | $4,902,934 | $5,468,123 | $(565,189) | (10.34) |

*Internal Service Funds*

**Summary Comparative Statements of Revenues, Expenses, and Changes in Net Position**

| | Year Ended June 30, 2016 | Year Ended June 30, 2015 | Amount of Change | Percentage Change |
|---|---|---|---|---|
| Premium receipts | $30,360,162 | $30,177,918 | $ 182,244 | 0.60% |
| Miscellaneous income | 480,120 | 480,120 | 0 | 0.00 |
| **Total operating revenue** | 30,840,282 | 30,658,038 | 182,244 | 0.59 |
| Premium disbursements | 30,328,802 | 30,157,271 | 171,531 | 0.57 |
| Premium refunds | 31,360 | 20,646 | 10,714 | 51.89 |
| Administrative expenses | 1,015,578 | 960,827 | 54,751 | 5.70 |
| **Total operating expenses** | 31,375,740 | 31,138,744 | 236,996 | 0.76 |
| **Net operating (loss)** | (535,458) | (480,706) | (54,752) | (11.39) |
| Investment income | 18,777 | 12,549 | 6,228 | 49.63 |
| **Net revenues (under) expenses** | (516,681) | (468,157) | (48,524) | (10.36) |
| **Net position beginning of year** | 745,306 | 1,213,463 | (468,157) | (38.58) |
| **Net position end of year** | $ 228,625 | $ 745,306 | $(516,681) | (69.32) |

*Internal Service Funds*

**Summary Comparative Statements of Cash Flows**

| | Year Ended June 30, 2016 | Year Ended June 30, 2015 | Amount of Change | Percentage Change |
|---|---|---|---|---|
| Cash flows from operating activities | $(566,218) | $ 244,691 | $(810,909) | (331.40)% |
| Cash flows from noncapital financing activities | 1,596 | (812) | 2,408 | 296.55 |
| Cash flows from investing activities | 564,622 | (243,879) | 808,501 | 331.52 |
| **Net change in cash** | 0 | 0 | 0 | |
| **Cash balances beginning of year** | 0 | 0 | 0 | |
| **Cash balances end of year** | $ 0 | $ 0 | $ 0 | |

*BASIC FINANCIAL STATEMENTS*

*Pension Trust Funds*

## **Statements of Fiduciary Net Position** | As of June 30, 2016

| | MSEP | Judicial Plan | Total |
|---|---|---|---|
| **Assets** | | | |
| Cash and short-term investments | $ 2,415,444,202 | $ 38,975,204 | $ 2,454,419,406 |
| Receivables | | | |
| State contributions | 14,435,893 | 1,441,218 | 15,877,111 |
| Investment sales | 36,445,191 | 588,074 | 37,033,265 |
| Investment income receivable | 36,300,888 | 585,745 | 36,886,633 |
| Other | 112,635 | 1,817 | 114,452 |
| Total receivables | 87,294,607 | 2,616,854 | 89,911,461 |
| Investments at fair value | | | |
| U.S. treasury securities | 3,895,855,245 | 62,862,868 | 3,958,718,113 |
| Government bonds & gov't. mortgage-backed securities | 46,850,062 | 755,965 | 47,606,027 |
| Corporate bonds | 109,828 | 1,772 | 111,600 |
| Convertible bonds | 953,401 | 15,384 | 968,785 |
| U.S. dollar-denominated international corporate bonds | 1,243,066 | 20,058 | 1,263,124 |
| Limited partnerships | 4,199,654,679 | 67,764,925 | 4,267,419,604 |
| Common stock | 282,345,885 | 4,555,886 | 286,901,771 |
| International equities | 776,612,307 | 12,531,286 | 789,143,593 |
| Foreign currency | 7,697,483 | 124,205 | 7,821,688 |
| Real estate investment trust | 10,477 | 169 | 10,646 |
| Options futures | (10,488,957) | (169,248) | (10,658,205) |
| Total investments | 9,200,843,476 | 148,463,270 | 9,349,306,746 |
| Invested securities lending collateral | 14,032,166 | 226,421 | 14,258,587 |
| Capital assets | | | |
| Land | 263,042 | 4,244 | 267,286 |
| Building and building improvements | 4,216,303 | 68,034 | 4,284,337 |
| Furniture, fixtures and equipment | 1,265,221 | 20,415 | 1,285,636 |
| Software | 713,057 | 11,506 | 724,563 |
| Total capital assets | 6,457,623 | 104,199 | 6,561,822 |
| Accumulated depreciation | (2,971,966) | (47,955) | (3,019,921) |
| Net capital assets | 3,485,657 | 56,244 | 3,541,901 |
| Prepaid expenses and other | 67,046 | 1,082 | 68,128 |
| Total assets | 11,721,167,154 | 190,339,075 | 11,911,506,229 |
| **Liabilities** | | | |
| Administrative expenses payable | 2,381,147 | 38,422 | 2,419,569 |
| Investment purchases payable | 36,107,528 | 582,625 | 36,690,153 |
| Securities lending collateral | 14,702,898 | 237,243 | 14,940,141 |
| Investment incentive fees payable | 9,405,806 | 151,771 | 9,557,577 |
| Employee vacation and overtime liability | 517,360 | 8,348 | 525,708 |
| Obligations under repo agreements | 3,544,271,820 | 57,189,777 | 3,601,461,597 |
| MOSERS investment portfolio liability (MIP) | 4,619,381 | 74,538 | 4,693,919 |
| Total liabilities | 3,612,005,940 | 58,282,724 | 3,670,288,664 |
| **Net Position** | | | |
| Net position, investment in capital assets | 3,485,657 | 56,244 | 3,541,901 |
| Restricted for pension benefits | 8,105,675,557 | 132,000,107 | 8,237,675,664 |
| Net position restricted for pensions | $ 8,109,161,214 | $132,056,351 | $ 8,241,217,565 |

See accompanying *Notes to the Financial Statements*.

*BASIC FINANCIAL STATEMENTS*

*Pension Trust Funds*

## **Statements of Changes in Fiduciary Net Position** | For Year Ended June 30, 2016

| | MSEP | Judicial Plan | Total |
|---|---|---|---|
| **Additions** | | | |
| Contributions | | | |
| State contributions | $ 329,957,369 | $ 33,642,498 | $ 363,599,867 |
| Employee contributions | 21,684,920 | 661,206 | 22,346,126 |
| Member purchases of service credit | 2,815,749 | 0 | 2,815,749 |
| Service transfer contributions | 2,107,873 | 0 | 2,107,873 |
| Total contributions | 356,565,911 | 34,303,704 | 390,869,615 |
| Investment income | | | |
| *From investing activities* | | | |
| Net appreciation in fair value of investments | 23,165,453 | 373,794 | 23,539,247 |
| Interest | 19,177,879 | 309,451 | 19,487,330 |
| Dividends | 3,475,864 | 56,086 | 3,531,950 |
| Other | 33,176,735 | 535,334 | 33,712,069 |
| Total investing activity income | 78,995,931 | 1,274,665 | 80,270,596 |
| Investing activity expenses: | | | |
| Management fees | (72,741,363) | (1,173,742) | (73,915,105) |
| Custody fees | (397,800) | (6,419) | (404,219) |
| Consultant fees | (860,950) | (13,892) | (874,842) |
| Performance measurement fees | (434,428) | (7,010) | (441,438) |
| Internal investment activity expenses | (3,366,920) | (54,328) | (3,421,248) |
| Total investing activity expenses | (77,801,461) | (1,255,391) | (79,056,852) |
| Net income from investing activities | 1,194,470 | 19,274 | 1,213,744 |
| *From securities lending activities* | | | |
| Securities lending income | 41,609 | 671 | 42,280 |
| Securities lending expenses: | | | |
| Borrower rebates | 95,022 | 1,533 | 96,555 |
| Management fees | (136,679) | (2,205) | (138,884) |
| Total securities lending activities expenses | (41,657) | (672) | (42,329) |
| Net (loss) from securities lending activities | (48) | (1) | (49) |
| Total net investment income | 1,194,422 | 19,273 | 1,213,695 |
| Miscellaneous income | 545,847 | 8,808 | 554,655 |
| Total additions | 358,306,180 | 34,331,785 | 392,637,965 |
| **Deductions** | | | |
| Benefits | 672,219,486 | 32,979,706 | 705,199,192 |
| BackDROP & lump sum benefits | 78,220,926 | 0 | 78,220,926 |
| Service transfer payments | 3,071,892 | 0 | 3,071,892 |
| Contribution refunds | 3,798,199 | 10,008 | 3,808,207 |
| Administrative expenses | 8,489,375 | 136,983 | 8,626,358 |
| Total deductions | 765,799,878 | 33,126,697 | 798,926,575 |
| Net (decrease) increase in net position | (407,493,698) | 1,205,088 | (406,288,610) |
| Net position restricted for pensions: | | | |
| Beginning of year | 8,516,654,912 | 130,851,263 | 8,647,506,175 |
| End of year | $8,109,161,214 | $132,056,351 | $8,241,217,565 |

See accompanying *Notes to the Financial Statements*.

*Internal Service Funds*

## **Statements of Net Position** | As of June 30, 2016

| | Life & LTD | Deferred Compensation | Total |
|---|---|---|---|
| **Assets** | | | |
| Premiums receivable | $ 962,006 | $ 0 | $ 962,006 |
| Investments at fair value | 3,639,529 | 295,513 | 3,935,042 |
| Capital assets | 0 | 12,466 | 12,466 |
| Accumulated depreciation — capital assets | 0 | (8,520) | (8,520) |
| Leasehold improvements | 0 | 3,880 | 3,880 |
| Accumulated depreciation — leasehold | 0 | (1,940) | (1,940) |
| Total assets | $4,601,535 | $301,399 | $4,902,934 |
| **Liabilities and net position** | | | |
| *Liabilities* | | | |
| Premiums payable | $4,550,931 | $ 0 | $4,550,931 |
| Checks outstanding net of deposits | 2,125 | 0 | 2,125 |
| Other | 114,418 | 6,835 | 121,253 |
| Total liabilities | 4,667,474 | 6,835 | 4,674,309 |
| *Unrestricted net position (deficit)* | (65,939) | 294,564 | 228,625 |
| Total liabilities and net position | $4,601,535 | $301,399 | $4,902,934 |

See accompanying *Notes to the Financial Statements*.

*Internal Service Funds*

## **Statements of Revenues, Expenses, and Changes in Net Position** | For Year Ended June 30, 2016

| | Life & LTD | Deferred Compensation | Total |
|---|---|---|---|
| **Operating revenues** | | | |
| Premium receipts | $30,360,162 | $ 0 | $30,360,162 |
| Miscellaneous income | 480,120 | 0 | 480,120 |
| Total operating revenues | 30,840,282 | 0 | 30,840,282 |
| **Operating expenses** | | | |
| Premium disbursements | 30,328,802 | 0 | 30,328,802 |
| Premium refunds | 31,360 | 0 | 31,360 |
| Administrative expenses | 550,843 | 464,735 | 1,015,578 |
| Total operating expenses | 30,911,005 | 464,735 | 31,375,740 |
| Operating revenues (under) operating expenses | (70,723) | (464,735) | (535,458) |
| **Non-operating revenues** | | | |
| Investment income | 15,207 | 3,570 | 18,777 |
| Net revenues (under) expenses | (55,516) | (461,165) | (516,681) |
| Net position (deficit) July 1, 2015 | (10,423) | 755,729 | 745,306 |
| Net position (deficit) June 30, 2016 | $ (65,939) | $ 294,564 | $ 228,625 |

See accompanying *Notes to the Financial Statements*.

BASIC FINANCIAL STATEMENTS

*Internal Service Funds*

## Statements of Cash Flows | Year Ended June 30, 2016

| | Life & LTD | Deferred Compensation | Total |
|---|---|---|---|
| **Cash flows from operating activities** | | | |
| Cash received from employer and members | $ 30,856,965 | $ 0 | $ 30,856,965 |
| Payments to outside carriers | (30,174,726) | 0 | (30,174,726) |
| Refunds of premiums to members | (31,360) | 0 | (31,360) |
| Cash payments to employees for services | (343,794) | (317,349) | (661,143) |
| Cash payments to other suppliers of goods and services | (418,060) | (137,894) | (555,954) |
| Net cash (used) by operating activities | (110,975) | (455,243) | (566,218) |
| **Cash flows from noncapital financing activities** | | | |
| Implicit funding of checks outstanding net of deposits | 2,125 | 0 | 2,125 |
| Implicit repayment of prior years checks outstanding net of deposits | (529) | 0 | (529) |
| Net cash provided by noncapital financing activities | 1,596 | 0 | 1,596 |
| **Cash flows from investing activities** | | | |
| Purchase of investment securities | (1,098,605,133) | 0 | (1,098,605,133) |
| Proceeds from sale and maturities of investment securities | 1,098,699,305 | 452,869 | 1,099,152,174 |
| Cash received from investment income | 15,207 | 3,570 | 18,777 |
| Purchase of capital assets | 0 | (1,196) | (1,196) |
| Net cash provided by investing activities | 109,379 | 455,243 | 564,622 |
| Net increase in cash | 0 | 0 | 0 |
| Cash balances June 30, 2015 | 0 | 0 | 0 |
| Cash balances June 30, 2016 | $ 0 | $ 0 | $ 0 |
| **Reconciliation of operating revenues under operating expenses to net cash (used) by operating activities** | | | |
| Operating revenues (under) operating expenses | $ (70,723) | $(464,735) | $ (535,458) |
| *Adjustments to reconcile operating revenues over (under) operating expenses to net cash provided (used) by operating activities* | | | |
| Depreciation expense | 0 | 2,658 | 2,658 |
| Change in assets and liabilities: | | | |
| Increase in operational accounts receivable | 16,683 | 0 | 16,683 |
| Increase (decrease) in operational accounts payable | (56,935) | 6,834 | (50,101) |
| Total adjustments | (40,252) | 9,492 | (30,760) |
| Net cash (used) by operating activities | $ (110,975) | $(455,243) | $ (566,218) |

See accompanying *Notes to the Financial Statements*.

## **Notes to the Financial Statements** | Year Ended June 30, 2016

### *(1) Plan Descriptions and Contribution Information*

**Missouri State Employees' Plan (MSEP)**

The MSEP is a cost-sharing multiple-employer, defined benefit public employee retirement plan with two benefit structures known as the MSEP (closed plan) and MSEP 2000 (which includes the MSEP 2011 tier), which are administered by the Missouri State Employees' Retirement System (MOSERS) in accordance with Sections 104.010 and 104.312 to 104.1215 of the Revised Statutes of Missouri (RSMo). As established under Section 104.320, RSMo, MOSERS is a body corporate and an instrumentality of the state. In the system are vested the powers and duties specified in Sections 104.010 and 104.312 to 104.1215, RSMo and such other powers as may be necessary or proper to enable it, its officers, employees, and agents to carry out fully and effectively all the purposes of Sections 104.010 and 104.312 to 104.1215, RSMo.

Responsibility for the operation and administration of the system is vested in the 11-member MOSERS Board of Trustees as defined by state law. Due to the nature of MOSERS' reliance on funding from the state of Missouri and the overall control of the plan document by the legislative and executive branches of state government, the MSEP is considered a component unit of the state of Missouri financial reporting entity and is included in the state's financial reports as a pension trust fund.

The board intends to follow a financing pattern which computes and requires contribution amounts which, expressed as a percent of active member payroll, will remain approximately level from year-to-year and from one generation of citizens to the next generation. For the year ended June 30, 2016, the employer contribution rate was 16.97% of covered payroll.

Complete recognition of the year-to-year swings in the fair value of system assets would produce contribution rate changes that would run counter to the "approximately level" goal. A common actuarial practice, referred to as asset smoothing, is used to address that issue. As a result of smoothing, investment gains or losses, relative to what would have been earned at the assumed rate on the actuarial value of assets, are added to any previously unrecognized gains or losses and one-fifth of that total amount was recognized in the June 30, 2016 valuation, with four-fifths deferred for future recognition. In no event may the actuarial value of assets as of the valuation date be more than 125% or less than 80% of the fair value of assets on that date.

For the actuarial valuation, the nominal investment return assumption is 7.65% and wage inflation and price inflation are 3% and 2.5%, respectively. See the *Actuarial Section* for all actuarial assumptions used.

At any point in time, the ratio of actuarial to fair value of assets will be more or less than the fair value but, if the smoothing method is prudent and properly constructed, those values will converge over time. As of June 30, 2016, and 2015, the ratio of actuarial to fair value of assets was 109% and 103%, respectively for the MSEP.

Generally, all full-time state employees hired before July 2000 and became vested, who were not covered under another state-sponsored retirement plan, are eligible for membership in the MSEP (closed plan). Full-time state employees hired after July 2000, and before January 2011, are eligible for membership in the MSEP 2000. Employees hired for the first time in a benefit eligible position on or after January 2011 are eligible for membership in the MSEP 2011 tier of the MSEP 2000. MOSERS participates as an employer in the MSEP and MSEP 2000. The MSEP provides retirement, survivor, and disability benefits.

**As of the June 30, 2016 valuation, membership* in the MSEP consisted of the following:**

| | | |
|---|---|---|
| Retirees and beneficiaries currently receiving benefits | | 44,828 |
| Terminated employees entitled to, but not yet receiving benefits | | 19,512 |
| Active | | |
| Vested | 32,111 | |
| Nonvested | 17,353 | 49,464 |
| Total membership | | 113,804 |

* *Excludes 132 members on leave of absence and 928 members on long-term disability.*

### MSEP (closed plan)

General state employees are fully vested for benefits upon receiving 5 years of credited service. Under the MSEP (closed plan), general employees may retire with full benefits upon the earliest of attaining:

- Age 65 with 5 years of service;
- Age 60 with 15 years of service; or
- Age 48 with age and service equaling 80 or more - "Rule of 80."

General employees may retire early at age 55 with at least 10 years of service with reduced benefits. The base benefit in the general employee plan is equal to 1.6% multiplied by the final average pay multiplied by years of credited service.

For members hired prior to August 28, 1997, cost-of-living adjustments (COLAs) are provided annually based on 80% of the percentage increase in the average consumer price index (CPI) from one year to the next, with a minimum rate of 4% and maximum rate of 5% until the cumulative amount of COLAs equals 65% of the original benefit. Thereafter, the 4% minimum rate is eliminated. For members hired on or after August 28, 1997, COLAs are provided annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Qualified, terminated-vested members may make a one-time election to receive the present value of their benefit in a lump sum payment. A member must have terminated with at least 5, but less than 10 years of service, not within five years of retirement eligibility, be less than age 60, and with a benefit present value of less than $10,000.

Contributions are determined through annual actuarial valuations. Contributions for FY16 were 16.97% of covered payroll, which is the rate set as a minimum policy employer contribution determined by the June 30, 2013, actuarial valuation until the actuarial funding ratio of the MOSERS plan is at least 80%. Contributions will continue at the policy minimum of 16.97% through the year ended June 30, 2017. Administration of the MSEP is financed through contributions to this plan from the state of Missouri and its component employers and investment earnings.

### MSEP 2000

General state employees are fully vested for benefits upon receiving 5 years of credited service. Under the MSEP 2000, general employees may retire with full benefits upon the earliest of attaining:

- Age 62 with 5 years of service; or
- Age 48 with age and service equaling 80 or more - "Rule of 80."

General employees may retire early at age 57 with at least 5 years of service with reduced benefits. The base benefit in the general employee plan is equal to 1.7% multiplied by final average pay multiplied by years of credited service.

For those retiring under "Rule of 80," an additional temporary benefit equivalent to 0.8% multiplied by final average pay multiplied by years of credited service is payable until age 62.

COLAs are provided annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Contributions are determined through annual actuarial valuations. Contributions for FY16 were 16.97% of covered payroll, which is the rate set as a minimum policy employer contribution determined by the June 30, 2013, actuarial valuation until the actuarial funding ratio of the MOSERS plan is at least 80%. Contributions will continue at the policy minimum of 16.97% through the year ended June 30, 2017. Administration of the MSEP 2000 is financed through contributions to this plan from the state of Missouri and its component employers and investment earnings.

The state of Missouri is required to make all contributions to the MSEP. Prior to September 1, 1972, contributions by members were required. Accumulated employee contributions made prior to that time, plus interest through August 28, 1997, are refundable to the member or designated beneficiaries upon request.

### MSEP 2011

On July 19, 2010, an additional tier of the MSEP 2000 defined benefit plan was signed into law for members of MOSERS. This tier (MSEP 2011) includes all new employees first hired on or after January 1, 2011.

Under the MSEP 2011, general employees may retire with full benefits upon the earliest of attaining:

- Age 67 with 10 years of service; or
- Age 55 with age and service equaling 90 or more - "Rule of 90."

General employees may retire early at age 62 with at least 10 years of service with reduced benefits. The base benefit in the general employee plan is equal to 1.7% multiplied by final average pay multiplied by years of credited service.

For those retiring under "Rule of 90," an additional temporary benefit equivalent to 0.8% multiplied by final average pay multiplied by years of credited service is payable until age 62.

COLAs are provided annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Member contributions are 4% of pay. Employer contributions are determined through annual actuarial valuations. Contributions for FY16 were 16.97% of covered payroll, which is the rate set as a minimum policy employer contribution determined by the June 30, 2013, actuarial valuation until the actuarial funding ratio of the MSEP is at least 80%. Contributions will continue at the policy minimum of 16.97% through the year ended June 30, 2017. Administration of the MSEP 2011 is financed through contributions to this plan from the member, state of Missouri and its component employers, and investment earnings.

The MSEP 2011 does not impact employees employed by the state prior to January 1, 2011.

For a detailed summary of benefits for general employees, legislators, and elected officials under the MSEP, MSEP 2000, and MSEP 2011 tier, refer to the *Summary of Plan Provisions* in the *Actuarial Section* of this report.

### Judicial Plan

The Judicial Plan is a single-employer, public employee retirement plan administered in accordance with Sections 476.445 to 476.690, RSMo. Responsibility for the operation and administration of the Judicial Plan is vested in the MOSERS Board of Trustees. Due to the nature of MOSERS' reliance on funding from the state of Missouri and the overall control of the plan document by the legislative and executive branches of state government, the Judicial Plan is considered a component unit of the state of Missouri financial reporting entity and is included in the state's financial reports as a pension trust fund.

For the actuarial valuation of the Judicial Plan, the nominal investment return assumption is 7.65% and wage inflation and price inflation are 3% and 2.5%, respectively. See the *Actuarial Section* for all actuarial assumptions used.

Judges and commissioners of the supreme court or the court of appeals, judges of the circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections, justices of the peace, commissioners or deputy commissioners of the circuit court appointed after February 29, 1972, commissioners of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo, commissioners of the drug court pursuant to Section 478.466, RSMo, or commissioners of the family court are eligible for membership in the Judicial Plan. The Judicial Plan provides retirement, survivor, and disability benefits. Members are immediately eligible for benefits.

| As of the June 30, 2016 valuation, membership* in the Judicial Plan consisted of the following: | | |
|---|---|---|
| Retirees and beneficiaries currently receiving benefits | | 540 |
| Terminated employees entitled to, but not yet receiving benefits | | 26 |
| Active | | |
| Vested | 408 | |
| Nonvested | 0 | 408 |
| Total membership | | 974 |

* *Excludes 1 member on long-term disability.*

Under the Judicial Plan, members may retire with full benefits upon the earliest of attaining:

- Age 62 with 12 years of service;
- Age 60 with 15 years of service; or
- Age 55 with 20 years of service.

Employees may retire early at age 62 with less than 12 years of service or age 60 with less than 15 years of service with a reduced benefit that is based upon years of service relative to 12 or 15 years.

In the Judicial Plan, the base benefit for members with 12 or more years of service is equivalent to 50% of compensation on the highest court served.

For members hired prior to August 28, 1997, COLAs are provided annually based on 80% of the percentage increase in the average CPI from one year to the next, with a minimum rate of 4% and a maximum rate of 5% until the cumulative amount of COLAs equals 65% of the original benefit. Thereafter, the 4% minimum rate is eliminated. For members hired on or after August 28, 1997, COLAs are provided annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Qualified, terminated-vested members may make a one-time election to receive the present value of their benefit in a lump sum payment. A member must have terminated with at least 5, but less than 10 years of service, not be within five years of retirement eligibility, and have a benefit present value of less than $10,000.

Funding of the Judicial Plan on an actuarial basis began on July 1, 1998. Contributions are determined through annual actuarial valuations. Contributions for FY16 were 58.45% of covered payroll, which is the rate set as a minimum policy employer contribution determined by the June 30, 2013, actuarial valuation until the actuarial funding ratio of the Judicial Plan is at least 80%. Contributions will continue at the policy minimum of 58.45% through the year ended June 30, 2017. The state of Missouri makes the employer contribution to the Judicial Plan. Administration of the Judicial Plan is financed through contributions to this plan from the state of Missouri and investment earnings.

#### Judicial Plan 2011 Tier

On July 19, 2010, an additional tier of the Judicial defined benefit plan was signed into law. This tier (Judicial Plan 2011) includes all new judicial members first serving in a benefit eligible position on or after January 1, 2011.

Under the Judicial Plan 2011, members may retire with full benefits upon the earliest of attaining:

- Age 67 with 12 years of service; or
- Age 62 with 20 years of service; or

Judicial members may retire early at age 67 with less than 12 years of service with reduced benefits, or age 62 with less than 20 years of service with a reduced benefit based on years of service.

For a more detailed summary of benefits for members of the Judicial Plan, refer to the *Summary of Plan Provisions* in the *Actuarial Section* of this report.

#### Missouri State Insured Defined Benefit Insurance Plan

The Missouri State Insured Defined Benefit Insurance Plan is accounted for as an internal service fund of the state of Missouri and is administered through The Standard, which is a third-party administrator with oversight by MOSERS. It provides basic life insurance in an amount equal to one times annual salary while actively employed (with a $15,000 minimum) to eligible members of the MSEP, MSEP 2000 (except employees of the Missouri Department of Conservation and certain state colleges and universities), MSEP 2011, Judicial Plan, Judical Plan 2011, and certain members of the Public School Retirement System.

The plan also provides duty-related death benefits, optional life insurance for active employees and retirees who are eligible for basic coverage, and a long-term disability insurance plan for certain eligible members. For a more detailed description of insurance benefits, refer to page 121-122 in the *Actuarial Section* of this report.

Due to the nature of MOSERS' reliance on funding from the state of Missouri and its component employers, and the overall control of the plan document by the legislative and executive branches of state government, the Missouri State Insured Defined Benefit Insurance Plan is considered a component unit of the state of Missouri financial reporting entity and is included in the state's financial reports as an internal service fund. Administration of the Missouri State Insured Defined Benefit Insurance Plan is financed through contributions from the state of Missouri and its component employers.

### State of Missouri Deferred Compensation Plan

The State of Missouri Deferred Compensation Plan is accounted for as an internal service fund. MOSERS uses ICMA-RC as an external provider for record keeping. Total plan assets as of June 30, 2016 were $1,866,004,878.

Record keeping of individual accounts and management of investment options are paid from charges to the participants and investment option reimbursement arrangements. Participants in the plan manage individual accounts by choosing investment options from the available fund lineup. MOSERS' role is to oversee the plan, choose external providers and investment options, and develop communication to plan participants. In FY16, a total of $2,779,514 was collected from a combination of $1,918,908 in investment option reimbursements and $860,606 in participant fees.

Effective July 1, 2012, new permanent full-time and part-time employees are automatically enrolled at 1% of pay into the State of Missouri Deferred Compensation Plan. As of June 30, 2016, 12,637 currently active employees have been automatically enrolled in the plan since inception. There are 11,359 employees who continue to contribute to the plan, making the opt-out rate 10.1%.

The State of Missouri Deferred Compensation Plan offers participants the ability to purchase units of MOSERS' investments as an investment option. As of June 30, 2016, 199 participants have $4,693,919 invested in the MOSERS Investment Portfolio (MIP) fund.

Audited financial statements for the State of Missouri Deferred Compensation Plan can be viewed at *www.modeferredcomp.org*.

## *(2) Summary of Significant Accounting Policies and Plan Asset Matters*

### Basis of Accounting

The financial statements of the MSEP, the Judicial Plan, the Missouri State Insured Defined Benefit Insurance Plan and the State of Missouri Deferred Compensation Plan were prepared using the accrual basis of accounting. The accompanying financial statements are prepared in accordance with accounting principles generally accepted in the U.S. that apply to governmental accounting for fiduciary funds.

Contributions are recognized as revenues when due, pursuant to statutory requirements. Benefits and refunds are recognized when due and payable and expenses are recorded when the corresponding liabilities are incurred regardless of when contributions are received or payment is made. The direct method of reporting cash flows is used.

### Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the U.S. requires management to make estimates and assumptions that affect the accompanying financial statements and disclosures. Actual results could differ from those estimates.

### Method Used to Value Investments

Section 104.440, RSMo allows the board of trustees to invest the trust fund assets in accordance with the prudent person rule. Investments of the pension trust funds and the internal service funds are reported on the basis of fair value. MOSERS unitizes investments for the purpose of allowing participants in the State of Missouri Deferred Compensation Plan the option to invest in the MOSERS investment portfolio (MIP). For financial reporting purposes, investments throughout this CAFR are reported in whole and include .05%, or $4,693,919, of the units invested in the MIP by Deferred Compensation participants. The schedule on page 47 provides a summary of the fair value of the investments as reported on the *Statements of Fiduciary Net Position* of the pension trust funds and *Statements of Net Position* of the internal service funds.

GASB Statement No. 72, Fair Value Measurement and Application, which was adopted during the year ended June 30, 2016, addresses accounting and reporting issues related to fair value measurements. This statement requires disclosures to be made about fair value measurements, the level of fair value hierarchy, and valuation techniques. Comprehensive footnote disclosures regarding this statement can be found in note *(3) Cash and Investments*.

Fair values for the equity real estate investments are based on appraisals. Fair values of the limited partnership investments are based on valuations of the underlying companies of the limited partnerships as reported by the general partner. Certain limited partnerships reflect values and related performance on a quarter lag basis due to the nature of those investments and the time it takes to value them. Fair value of the commingled funds is determined based on the underlying asset values. The remaining assets are primarily valued by the system's master custodian, BNY Mellon, using the last trade price information supplied by various pricing data vendors.

## *(3) Cash and Investments*

### Cash

Custodial credit risk for cash deposits and investments is the risk that, in the event of a bank failure, the system and plan deposits may not be returned. The board adopted the following policy on June 18, 2009:

*The executive director shall require that banks managing demand deposit accounts for any retirement plan associated with MOSERS (MOSERS' defined benefit plan and the deferred compensation plan/state incentive compensation plan) to hold, at minimum, collateral security in either MOSERS' name or the State of Missouri Deferred Compensation Plan and in an amount equal to, or more than, the amount on deposit that exceeds the Federal Deposit Insurance Corporation (FDIC) insured amount. The types of collateral security shall be included on a list maintained by the State Treasurer's office in accordance with Section 30.270 RSMo, but in no case may a bank pledge collateral that does not specifically allow MOSERS to release the collateral or pledge collateral that represents securities of the pledging banks.*

Cash balances represent both demand deposit accounts held at the bank and investment cash on deposit with the investment custodian. To maximize investment income, the float caused by outstanding checks is invested in an internally managed short-term investment account, thus causing a possible negative book balance. Negative book balances are reflected in the liabilities' section of the *Statements of Net Position* of the internal service funds and included in the cash and short-term investments on the *Statements of Fiduciary Net Position* of the pension trust funds.

The table below is a schedule of the aggregate book and bank balances of all cash accounts.

### Aggregate Book and Bank Balances

| | Cash Balances | |
|---|---|---|
| | Book | Bank/Investment Custodian |
| **Pension trust funds** - investment custodian | $ (40,581) | $(40,581) |
| **Pension trust funds** - demand deposits | (9,681,027) | 66,551 |
| **Internal service fund** - insurance plan demand deposits | (2,125) | 106 |

Under the repurchase agreement, the bank does not have the right to substitute other appropriate securities. Central Trust Bank pledged the following securities to MOSERS on June 30, 2016, as collateral for overnight repurchase agreements:

### Collateral for Overnight Repurchase Agreements

| | Maturity | Pledged | Fair Value |
|---|---|---|---|
| Federal Home Loan Mortgage Corp. | 1/12/2018 | $5,000,000 | $5,008,550 |
| Federal Home Loan Mortgage Corp. | 2/27/2018 | 5,000,000 | 5,013,450 |
| Federal National Mortgage Association | 3/13/2018 | 3,000,000 | 3,028,680 |
| Federal Home Loan Mortgage Corp. | 8/18/2018 | 2,436,000 | 2,459,751 |
| Small Business Association Pool | 6/25/2019 | 839,007 | 865,301 |
| Small Business Association Pool | 10/25/2027 | 2,201,670 | 2,247,685 |
| Small Business Association Pool | 12/25/2036 | 905,703 | 964,537 |
| Small Business Association Pool | 4/25/2039 | 3,624,134 | 4,029,301 |

## Investments

### Investment Policy

In 2015, MOSERS completed a transition to a portfolio that shifted from a return-driven process to a risk-driven process using an allocation approach that focuses on fundamental economic factors such as growth and inflation as well as other factors with expected return values such as credit, carry, and illiquidity.

MOSERS' policy, with respect to the allocation of invested assets, is established and may be amended by the board of trustees majority vote. The board's guiding principles with respect to the investment of MOSERS' assets are to preserve the long-term corpus of the fund, maximize total return within prudent risk parameters, and act in the exclusive interest of the members of the system. The board has developed a risk-weighted policy allocation that is designed to achieve the long-term required return objectives of the system, given certain risk constraints. The current asset allocation reflects a diversified portfolio, which will perform well in a variety of economic conditions and will help reduce the portfolio's overall volatility.

The board has authorized staff to create and maintain an internally managed beta-balanced portfolio that utilizes a modest amount of leverage in order to balance the risk allocations equally across the five asset classes contained in that portfolio. The leverage is limited to 1.25 times of beta-balanced capital. The limit may also be stated as 225% of beta-balanced capital. The table below illustrates the fair value, market exposure, and policy exposure of the internally managed beta-balanced portfolio by asset class as of June 30, 2016.

### Schedule of Internally Managed Leverage

| Internal beta-balanced portfolio | Fair Value of Internally Managed Beta-Balanced Capital | Percent of Investments at Fair Value | Market Exposure | Percent of Investments at Market Exposure* | Policy Exposure Beta-Balanced |
|---|---|---|---|---|---|
| Beta-balanced equities | $1,156,949,774 | 20.3% | $ 1,358,911,157 | 23.8% | 24% |
| Beta-balanced nominal bonds | 669,269,342 | 11.7 | 2,222,780,778 | 38.9 | 46 |
| Beta-balanced commodities | 364,077,818 | 6.4 | 1,155,946,291 | 20.2 | 21 |
| Beta-balanced inflation linked bonds | 1,329,465,125 | 23.3 | 4,189,752,830 | 73.4 | 80 |
| Beta-balanced alternative beta | 2,188,780,688 | 38.3 | 2,093,608,307 | 36.7 | 39 |
| Total internal beta-balanced portfolio | $5,708,542,747 | 100.0% | $11,020,999,363 | 193.0% | 210% |

* *The actual amount of leverage in the internally managed beta-balance portfolio was 0.93 and 1.17 times beta-balanced capital or 193% and 217% as of June 30, 2016, and 2015, respectively.*

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate rates of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of geometric real rates of return for each major asset class included in MOSERS' target asset allocation as of June 30, 2016, are summarized in the table below.

### Target Asset Allocation

| | Policy Allocation | Long-Term Expected Real Rate of Return* | Weighted Average Long-Term Expected Real Rate of Return |
|---|---|---|---|
| Beta-balanced portfolio | 80.0% | 5.7% | 4.6% |
| Illiquids portfolio** | 20.0 | 7.3 | 1.5 |
| | 100.0% | | 6.1% |

* *Represents best estimates of geometric rates of return for each major asset class included.*

** *Illiquid portfolio upper limit of 27.5% of capital, no new commitments past 23%.*

**Concentration of Credit Risk**
Concentration of credit risk is the risk of loss attributed to the magnitude of an investment in a single-issuer. Issuer concentration limits are established in individual portfolio guidelines that generally do not allow a single issuer to be greater than 5% of the portfolio's fair value. As of fiscal year end, there is no single issuer exposure, exclusive of investments issued or explicitly guaranteed by the U.S. government, within MOSERS' portfolio that comprises 5% or more of the overall portfolio or MOSERS' fiduciary net position. Therefore, there is no concentration of credit risk to report.

**Money-Weighted Rate of Return**
The annual money-weighted rate of return on pension plan investments, net of pension plan investment expense, was 0.08% for the year ended June 30, 2016. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for changing amounts actually invested.

**Fair Value Measurement**
MOSERS categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles. The hierarchy is based on the valuation inputs used to measure the fair value of the asset and give the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (level 1 measurements) and the lowest priority to unobservable inputs (level 3 measurements).

- **Level 1** – Unadjusted quoted prices for identical instruments in active markets.
- **Level 2** – Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations in which all significant inputs are observable.
- **Level 3** – Valuations derived from valuation techniques in which significant inputs are unobservable.

Investments that are measured at fair value using the net asset value per share (or its equivalent) as a practical expedient are not classified in the fair value hierarchy.

The categorization of investments within the hierarchy is based upon the pricing transparency of the instrument and should not be perceived as the particular investment's risk.

In instances where inputs used to measure fair value fall into different levels in the fair value hierarchy, fair value measurements in their entirety are categorized based on the lowest level input that is significant to the valuation. MOSERS' assessment of the significance of particular inputs to these fair value measurements requires judgment and considers factors specific to each asset or liability. The tables on pages 36 and 37 show the fair value leveling of the investments.

Debt, equities, and investment derivatives classified in level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities.

Debt securities and liabilities classified in level 2 have non-proprietary information that was readily available to market participants from multiple independent sources, which are known to be actively involved in the market. Pricing inputs may include market quotations, yields, maturities, call features and ratings. Derivative securities classified in level 2 are securities whose values are derived daily from associated traded securities.

Private equity securities classified in level 2 are valued at the price observed in subsequent market activity.

## Investments and Derivative Instruments Measured at Fair Value

| | | Fair Value Measurement Using | | |
|---|---|---|---|---|
| June 30, 2016 | Total | (Level 1) | (Level 2) | (Level 3) |
| **Investments by fair value level** | | | | |
| Assets | | | | |
| *Equity securities* | | | | |
| U.S. common and preferred stock | $ 110,273,551 | $ 110,273,542 | $ 0 | $9 |
| Foreign stocks | 2,817,431 | 2,817,431 | 0 | 0 |
| Private equity investments | 33,584,736 | 0 | 33,584,736 | 0 |
| Total equity securities | 146,675,718 | 113,090,973 | 33,584,736 | 9 |
| *Debt securities* | | | | |
| U.S. short-term funds | 589,280,000 | 589,280,000 | 0 | 0 |
| Repurchase agreements | 1,020,000,000 | 0 | 1,020,000,000 | 0 |
| U.S. agency obligations | 512,553,980 | 0 | 512,553,980 | 0 |
| Foreign debt securities | 48,740,764 | 0 | 48,740,764 | 0 |
| U.S. government | 4,308,956,216 | 4,308,844,616 | 111,600 | 0 |
| Total debt securities | 6,479,530,960 | 4,898,124,616 | 1,581,406,344 | 0 |
| Total investment assets | 6,626,206,678 | 5,011,215,589 | 1,614,991,080 | 9 |
| Liabilities | | | | |
| Reverse repurchase agreements | (3,601,461,597) | 0 | (3,601,461,597) | 0 |
| Total net investment assets by fair value level | 3,024,745,081 | 5,011,215,589 | (1,986,470,517) | 9 |
| **Investment derivative instruments** | | | | |
| Futures contracts | (16,251,526) | (16,251,526) | 0 | 0 |
| Options contracts | (10,658,205) | (10,658,205) | 0 | 0 |
| Foreign exchange forward contracts | 283,152 | 283,152 | 0 | 0 |
| Swap market value | 46,713,441 | 0 | 46,713,441 | 0 |
| Total investment derivative instruments | 20,086,862 | (26,626,579) | 46,713,441 | 0 |
| **Invested securities lending collateral** | | | | |
| U.S. short-term funds | 1,150,731 | 1,150,731 | 0 | 0 |
| Commingled fund | 37,210 | 0 | 37,210 | 0 |
| Repurchase agreements | 13,070,637 | 0 | 13,070,637 | 0 |
| Total invested securities lending collateral | 14,258,578 | 1,150,731 | 13,107,847 | 0 |
| **Investments measured at the net asset value (NAV)** | | | | |
| Commingled international equity funds | 1,015,154,207 | | | |
| Hedge funds | 2,682,202,360 | | | |
| Private equity funds | 1,038,341,403 | | | |
| Private real estate funds | 192,594,190 | | | |
| Private timber funds | 269,476,522 | | | |
| Total investments measured at NAV | 5,197,768,682 | | | |
| **Other Investments** | | | | |
| STIF not leveled (payable for investment purchased and other misc.) | (25,763,203) | | | |
| Other cash | 7,722,350 | | | |
| Other not leveled | 3,315,939 | | | |
| Total other investments | (14,724,914) | | | |
| **Total fund value excluding securities lending collateral** | $ 8,227,875,711 | | | |
| Reconciliation to *Statement of Fiduciary Net Position* | | | | |
| Total portfolio value | $ 8,227,875,711 | | | |
| Reverse repurchase agreements | 3,601,461,597 | | | |
| STIF | (2,454,472,797) | | | |
| Uninvested cash | 40,581 | | | |
| Interest and dividends receivable | (53,130,415) | | | |
| Variation margin | 16,251,526 | | | |
| Accounts receivable securities sold | (37,033,265) | | | |
| Accounts payable securities purchased | 36,690,153 | | | |
| Fees payable | 10,942,073 | | | |
| Securities lending liability | 681,582 | | | |
| Investments per *Statement of Fiduciary Net Position* | $ 9,349,306,746 | | | |

## Investments Measured at the Net Asset Value

| | June 30, 2016 | Unfunded Commitments | | Redemption Frequency (If Currently Eligible) | Redemption Notice Period (Days) |
|---|---|---|---|---|---|
| **Commingled international equity funds**[1] | $1,015,154,207 | | | Daily, Monthly | 1-30 |
| **Active hedge funds** | | | | | |
| Long/short equity [2] | 323,863,713 | | | Quarterly, Semi-Annually, Annually | 30-60 |
| Merger arbitrage [3] | 52,905,567 | | | Monthly | 45 |
| Multi-strategy [4] | 70,233,163 | | | Quarterly | 65 |
| Equity market neutral [5] | 93,088,991 | | | Quarterly | 90 |
| Long/short credit [6] | 49,671,221 | | | Quarterly | 75 |
| Event driven [7] | 168,584,338 | | | Quarterly | 60-65 |
| Macro [8] | 192,630,891 | | | Monthly, Quarterly | 30 |
| Risk premia [9] | 390,077,788 | | | Bi-Weekly, Monthly | 15-30 |
| Risk parity [10] | 887,779,412 | | | Monthly | 5-15 |
| Fund-of-funds [11] | 348,119,832 | | | Monthly | 95 |
| **Pending liquidated hedge funds** [12] | 105,247,444 | | | | |
| **Private equity funds** [13] | 1,038,341,403 | $437,652,900 | € 868,751 | | |
| **Private real estate funds** [13] | 192,594,190 | 20,028,847 | | | |
| **Private timber funds** [13] | 269,476,522 | 0 | | | |
| Total investments measured at NAV | $5,197,768,682 | $457,681,747 | € 868,751 | | |

1 **Commingled international equity funds** – Three international equity funds are considered to be commingled in nature. Each are valued at the net asset value held at the end of the period based upon the fair value of the underlying investments.

2 **Long/short equity hedge funds** – Consisting of four funds, this strategy invests both long and short in U.S. and global equity securities, with a goal of adding growth and minimizing market exposure. These investments are valued at NAV. Due to contractual lock-up restrictions, these investments remain restricted for anywhere ranging from four to 30 months.

3 **Merger arbitrage hedge fund** – Consisting of one fund, this strategy invests in the common stock of companies that are involved in publicly announced mergers and seeks to generate attractive returns while dampening volatility. This investment is valued at NAV, is redeemable monthly, and is not subject to lock-up restrictions.

4 **Multi-strategy hedge fund** – Consisting of one fund, this fund aims to pursue varying strategies in order to diversify risks and reduce volatility. This investment is valued at NAV, is redeemable quarterly, and is not subject to lock-up restrictions.

5 **Equity market neutral hedge fund** – Consisting of one fund, this strategy invests both long and short in U.S. and global equity securities, with the goal of having little to no net market exposure. This investment is valued at NAV, is redeemable quarterly, and is not subject to lock-up restrictions.

6 **Long/short credit hedge fund** – Consisting of one fund, this strategy invests in corporate bonds and leveraged loans within the U.S. and Europe with the goal of generating attractive risk adjusted returns. This investment is valued at NAV, is redeemable quarterly, and is not subject to lock-up restrictions.

7 **Event driven hedge funds** – Consisting of two funds, this strategy seeks to gain an advantage from pricing inefficiencies that may occur in the onset or aftermath of a corporate action or related event. These investments are valued at NAV. Due to contractual lock-up restrictions, approximately 16% of the value of these investments are eligible for redemption quarterly. The remaining 84% of the value of these investments remain restricted for 24 months.

8 **Macro hedge funds** – Consisting of two funds, this strategy seeks to take advantage of macroeconomic dislocations between countries by trading a number of different markets and financial instruments. This investment is valued at NAV, is redeemable monthly and quarterly, and is not subject to lock-up restrictions.

9 **Risk premia hedge funds** – Consisting of two funds, these strategies seek to capture hedge fund betas through the use of systematic, bottoms up security selection across major hedge fund strategies. Style premia such as value, momentum and carry help build the long/short portfolios. This investment is valued at NAV, is redeemable at least monthly, and is not subject to lock-up restrictions.

10 **Risk parity funds** – Consisting of two funds, these strategies attempt to build a more efficient portfolio through an equal risk methodology. They take long only positions across equity indices, developed nominal bonds, TIPS, commodities and credit. Diversification benefits decrease both the expected return and volatility thus requiring leverage to maintain a similar return to a more conventional portfolio. This investment is valued at NAV, is redeemable monthly, and is not subject to lock-up restrictions.

11 **Fund-of-funds** – Consisting of one fund, this fund seeks to provide diversification by holding a number of funds within a single fund structure. This investment is valued at NAV, is redeemable monthly, and is not subject to lock-up restrictions.

12 **Pending liquidated hedge funds** – Consisting of 13 funds which have been fully redeemed as of June 30, 2016, for which MOSERS is awaiting final distribution of the proceeds. Approximately 83% of the value was received within 90 days of June 30, 2016. The remaining 17% will be received upon sale of the underlying investments or upon completion of the audit of the firm's annual financial statements.

13 **Private equity, real estate and timber funds** – MOSERS' private equity portfolio consists of 60 funds with exposure to buyout funds, distressed funds, infrastructure, energy, royalty funds, and special situations. The real estate portfolio, comprised of five funds, invests mainly in U.S. commercial real estate. The timber portfolio consists of four funds which invests in global timberland. The fair values of the majority of these funds has been determined using net assets valued one quarter in arrears plus current quarter cash flows. These funds are not eligible for redemption. Distributions are received as underlying investments within the funds are liquidated, which on average can occur over the span of five to 10 years.

### Credit Risk

Credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligations to MOSERS. As of June 30, 2016, MOSERS' fixed income assets that are not government guaranteed represented 33.6% of the fixed income securities. In preparing this report, credit risk associated with all fixed income holdings including collateral for repurchase agreements and securities lending collateral has been included. The tables below summarize MOSERS' fixed income security exposure levels and credit qualities.

As a matter of practice, there are no overarching limitations for credit risk exposures within the overall fixed income portfolio. Each individual portfolio within fixed income is managed in accordance with operational guidelines that are specific as to permissible credit quality ranges, exposure levels within individual quality tiers, and average credit quality.

Credit risk for derivative instruments held by the system results from counterparty risk assumed by MOSERS. This is essentially the risk that the counterparty to a MOSERS transaction will be unable to meet its obligation. Information regarding MOSERS' credit risk related to derivatives can be viewed in the derivatives disclosures on page 42 of these notes.

Policies related to credit risk pertaining to MOSERS' securities lending program are found under the securities lending disclosures found on page 44 of these notes.

#### Average Credit Quality and Exposure Levels of Nongovernment Guaranteed Securities

| Fixed Income Security Type | Fair Value June 30, 2016 | Percent of all Fixed Income Assets | Weighted Average Credit Quality | Ratings Dispersion Requiring Further Disclosure |
|---|---|---|---|---|
| Collateralized mortgage obligations | $ 36,823,710 | 0.6% | AA | See below |
| Implicit U.S. government agencies | 475,752,040 | 7.3 | AA | See below |
| Non-U.S. sovereign | 48,499,083 | 0.7 | BBB | See below |
| Asset-backed securities | 37,210 | 0.0 | Not rated | See below |
| Corporate bonds | 1,391,576 | 0.0 | BBB | See below |
| Bank deposits | 550,000,000 | 8.5 | FDIC insured | None |
| Repurchase agreements | 1,033,084,559 | 15.9 | Not rated | None |
| Pooled investments | 40,430,731 | 0.6 | AAA | None |
| Total nongov't. guaranteed securities | $2,186,018,909 | 33.6% | | |
| Total fixed income securities | $6,508,184,108 | | | |

#### Ratings Dispersion Detail - Fair Value

| Credit Rating Level | Collateralized Mortgage Obligations | Non-U.S. Sovereign | Asset-Backed Securities | Corporate Bonds | Implicit U.S. Agencies |
|---|---|---|---|---|---|
| AA | $36,823,710 | | | $ 18,031 | $475,752,040 |
| A | | $13,847,733 | | 150,002 | |
| BBB | | 23,398,675 | | 1,115,693 | |
| BB | | 11,252,675 | | | |
| Not Rated | | | $37,210 | 107,850 | |
| | $36,823,710 | $48,499,083 | $37,210 | $1,391,576 | $475,752,040 |

As a matter of practice, there are no overarching limitations for credit risk exposures within the overall fixed income portfolio. Each individual portfolio within fixed income is managed in accordance with operational guidelines that are specific as to permissible credit quality ranges, exposure levels within individual quality tiers, and average credit quality.

**Interest Rate Risk**

Interest rate risk is the risk that changes in interest rates will adversely affect the fair value of an investment. This risk is managed by using the effective duration or option adjusted methodology. It is widely used in the management of fixed income assets by quantifying the risk of interest rate changes. This methodology takes into account optionality on bonds and scales the risk of price changes on bonds depending upon the degree of change in rates and the slope of the yield curve. Within the investment policy, operational guidelines specify the degree of interest rate risk taken within the system's fixed income portfolios, with the exception of some portfolios in which credit risk is the predominant factor and is also controlled by specific guidelines. MOSERS believes that the reporting of effective duration found in the tables below quantifies to the fullest extent possible the interest rate risk of the system's fixed income securities.

### Effective Duration of Fixed Income Assets by Security Type

| Fixed Income Security Type | Fair Value June 30, 2016 | Percent of all Fixed Income Assets | Weighted Average Effective Duration (Years) | Interest Rate Risk Requiring Further Disclosure |
|---|---|---|---|---|
| U.S. treasuries | $4,322,165,199 | 66.4% | 6.1 | See below |
| Implicit U.S. government agencies | 475,752,040 | 7.3 | 0.2 | none |
| Collateralized mortgage obligations | 36,823,710 | 0.6 | 0.1 | none |
| Non-U.S. sovereign | 48,499,083 | 0.7 | 5.1 | none |
| Asset-backed securities | 37,210 | 0.0 | 0.1 | none |
| Corporate bonds | 1,391,576 | 0.0 | 5.1 | none |
| Bank deposits | 550,000,000 | 8.5 | 0.0 | none |
| Repurchase agreements | 1,033,084,559 | 15.9 | 0.0 | none |
| Pooled investments | 40,430,731 | 0.6 | 0.0 | none |
| | $6,508,184,108 | 100.0% | 4.1 | |

### Effective Duration Analysis of U.S. Treasuries

| Maturity | Fair Value June 30, 2016 | Average Effective Duration of the Security Type (Years) | Contribution to Effective Duration (Years) |
|---|---|---|---|
| Less than 1 year to maturity | $ 350,302,472 | 0.2 | 0.0 |
| 1- to 10-year maturities | 3,673,464,760 | 5.7 | 4.9 |
| Long coupon treasuries | 298,397,967 | 17.2 | 1.2 |
| | $4,322,165,199 | | 6.1 |

MOSERS invests in mortgage-backed securities, which are reported at fair value in the *Statements of Fiduciary Net Position* of the pension trust funds. Such securities have embedded within them the risk of being called, whereby the issuer has the option to keep the debt outstanding in rising interest rate environments or repay the debt in declining interest rate environments, a factor that advantages the issuer. MOSERS invests in these securities to diversify the portfolio with high quality and liquid investments which capture a significant yield premium that is intended to compensate for the call risk. This risk is incorporated within the effective duration calculation used in the interest rate risk analysis.

**Repurchase Agreements**

Tri-party repurchase agreements (repos) are secured loans by a financial institution with the collateral held at a custodian bank. In a tri-party repo transaction, MOSERS transfers cash to a financial institution and the financial institution transfers securities to the custodian bank. Simultaneously, the financial institution promises to repay the loan in the future plus interest in exchange for the return of the securities.

Reverse repurchase agreements (reverse repos) are used to convert securities into cash. In a reverse repo transaction, MOSERS transfers securities that are owned in the portfolio to a financial institution and the financial institution transfers cash to MOSERS. Simultaneously, MOSERS promises to repay the loan in the future plus interest in exchange for the return of the securities.

Typical collateral for repos and reverse repos include treasury securities, agency securities, mortgage-backed securities, investment grade corporate bonds, commercial paper, and common stock. Repos and reverse repos are typically done for an overnight term; however, they can be done for a longer term. MOSERS enters into repo transactions to earn interest on short-term funds and enters into reverse repos to finance the purchase of additional securities.

The yield earned by MOSERS on the repo transactions ranged from 0.06% to 0.56% and had maturities of one day to 35 days. The yield earned by the counterparties on the reverse repo transactions ranged from 0.23% to 0.87% and had maturities of one month to one year. The maturities of the investments made with reverse repo proceeds generally have maturities of one to 30 years.

In repo transactions, MOSERS may have credit risk if the counterparty fails to repay the loan and the value of the securities held as collateral falls below the loan balance. To minimize this risk, MOSERS requires the financial institution to send collateral with a fair value greater than the value of the loan and revalues the collateral on a daily basis. As of fiscal year end, MOSERS held approximately $34.2 million of counterparty collateral in excess of the repo balance.

In reverse repo transactions, MOSERS may be subject to credit risk if the counterparty fails to return the securities and the value of the securities held as collateral rises above the loan balance. To minimize this risk, MOSERS sends the minimum amount of collateral required by the financial institution and requires the financial institution to revalue the collateral and return excess collateral on a daily basis. As of fiscal year end, counterparties held approximately $13.1 million of MOSERS collateral in excess of the reverse repo balance.

The tables below summarize MOSERS' exposure for repo and reverse repo transactions.

### Repurchase Agreements by Collateral Type

| Collateral Type | Fair Value of Collateral June 30, 2016 | Fair Value Including Accrued Interest of Repos June 30, 2016 | Excess (Deficit) Collateral | Percent Over Collateralized |
|---|---|---|---|---|
| U.S. treasuries/U.S. agencies | $ 824,232,291 | $ 808,070,637 | $16,161,654 | |
| Common stock | 243,017,848 | 225,000,000 | 18,017,848 | |
| Accrued interest | 0 | 13,922 | (13,922) | |
| | $1,067,250,139 | $1,033,084,559 | $34,165,580 | 3.3% |

### Reverse Repurchase Agreements by Collateral Type

| Collateral Type | Fair Value of Collateral June 30, 2016 | Market Value Including Accrued Interest of Reverse Repos June 30, 2016 | Excess (Deficit) Collateral | Percent Over Collateralized |
|---|---|---|---|---|
| U.S. treasuries | $3,612,548,612 | $3,592,235,615 | $20,312,997 | |
| Receivables | 2,054,332 | 0 | 2,054,332 | |
| Accrued interest | 0 | 9,225,982 | (9,225,982) | |
| | $3,614,602,944 | $3,601,461,597 | $13,141,347 | 0.4% |

**Foreign Currency Risk**

Foreign currency risk is the risk that changes in exchange rates will adversely impact the fair value of an investment. MOSERS' currency risk exposures, or exchange rate risk, primarily reside within MOSERS' international equity investment holdings. MOSERS' implementation policy allows external managers to decide what action to take regarding their respective portfolio's foreign currency exposures using currency forward contracts. MOSERS' exposure to foreign currency risk in U.S. dollars as of June 30, 2016, is highlighted in the table below.

## Currency Exposures by Asset Class

| Currency | Cash & Cash Equivalents | Equities | Fixed Income | Alternatives | Total |
|---|---|---|---|---|---|
| Argentine Peso | $ 24 | $ 1 | | | $ 25 |
| Australian Dollar | 355,661 | 92,982 | $ 179,165 | | 627,808 |
| Brazilian Real | 131,591 | 11,018,478 | 7,793,703 | | 18,943,772 |
| British Pound Sterling | (871,805) | 136,683,035 | 662,692 | | 136,473,922 |
| Canadian Dollar | (93,981) | 35,161 | 331,046 | | 272,226 |
| Chilean Peso | 36,228 | 1,612,976 | 43,790 | | 1,692,994 |
| Colombian Peso | 12,898 | 583,927 | 3,905,820 | | 4,502,645 |
| Czech Koruna | 10,149 | 305,297 | | | 315,446 |
| Danish Krone | | 10,531,097 | | | 10,531,097 |
| Egyptian Pound | 3,692 | 254,023 | | | 257,715 |
| Euro | (2,079,011) | 141,698,073 | (3,647,460) | $58,980,158 | 194,951,760 |
| Hong Kong Dollar | (400,360) | 99,780,767 | | | 99,380,407 |
| Hungarian Forint | 11,475 | 456,849 | | | 468,324 |
| Indian Rupee | 219,150 | 13,785,937 | | | 14,005,087 |
| Indonesian Rupiah | 76,758 | 4,992,782 | 5,385,812 | | 10,455,352 |
| Israeli Shekel | | 13 | | | 13 |
| Japanese Yen | 1,967,970 | 197,398,451 | 298,860 | | 199,665,281 |
| Malaysian Ringgit | 82,470 | 10,023,858 | 4,244,504 | | 14,350,832 |
| Mexican Peso | 158,710 | 8,587,999 | 5,190,004 | | 13,936,713 |
| Moroccan Dirham | 371 | | | | 371 |
| Norwegian Krone | | 5,391,160 | | | 5,391,160 |
| Peruvian Nuevo Sol | 3 | | | | 3 |
| Philippine Peso | 28,944 | 2,642,263 | | | 2,671,207 |
| Polish Zloty | 2,143 | 1,902,233 | 5,826,979 | | 7,731,355 |
| Qatari Riyal | 1 | 1,497,933 | | | 1,497,934 |
| Romanian New Leu | | | 638,235 | | 638,235 |
| Russian Ruble | | 537,370 | 3,254,070 | | 3,791,440 |
| Singapore Dollar | | 29,059,958 | | | 29,059,958 |
| South African Rand | (82,567) | 12,131,545 | 5,809,858 | | 17,858,836 |
| South Korean Won | (1,595,970) | 35,339,330 | 1,169,914 | | 34,913,274 |
| Swedish Krona | | 7,953,842 | | | 7,953,842 |
| Swiss Franc | | 80,397,457 | | | 80,397,457 |
| Taiwan New Dollar | 180,768 | 32,751,061 | | | 32,931,829 |
| Thai Baht | 16,547 | 28,070,267 | 2,032,167 | | 30,118,981 |
| Turkish Lira | 66,255 | 10,504,465 | 4,735,711 | | 15,306,431 |
| United Arab Emirates Dirham | 22,083 | 1,340,046 | | | 1,362,129 |
| Venezuelan Boliviar | 368 | | | | 368 |
| | $(1,739,435) | $887,360,636 | $47,854,870 | $58,980,158 | $992,456,229 |

**Derivatives**

Derivative instruments are financial contracts whose values depend on the values of one or more underlying assets, reference rates, or financial indexes. They include futures contracts, swap contracts, options contracts, and forward foreign currency exchange. The following tables summarize the various contracts in the portfolio as of June 30, 2016.

### Futures Contracts

| Futures Contract | Expiration Date | Long (Short) | Notional Value | Exposure |
|---|---|---|---|---|
| Currency futures | September 2016 | Long | $ 43,875,055 | $ (7,560) |
| Fixed income futures | September 2016 | Long | 1,657,001,186 | (7,762,711) |
| Equity index futures | July 2016 | (Short) | (3,922,629) | (86,387) |
| Equity index futures | September 2016 | Long | 61,023,909 | 415,346 |
| Commodity futures | August 2016 | Long | 180,079,780 | (4,912,980) |
| Commodity futures | September 2016 | Long | 108,973,758 | (3,744,808) |
| Commodity futures | October 2016 | Long | 7,876,068 | (205,066) |
| Commodity futures | November 2016 | Long | 2,825,463 | 99,838 |
| Commodity futures | December 2016 | Long | 5,394,528 | (136,248) |
| Commodity futures | January 2017 | Long | 2,549,316 | (62,462) |
| Commodity futures | February 2017 | Long | 3,393,104 | (82,580) |
| Commodity futures | March 2017 | Long | 5,398,957 | (128,801) |
| Commodity futures | April 2017 | (Short) | (15,808,304) | 363,061 |
| Total | | | $2,058,660,191 | $(16,251,358) |

### Foreign Currency Forward Contracts at June 30, 2016

| Currency | Net Notional Long (Short) | Exposure |
|---|---|---|
| Brazilian Real | $ (1,976,267) | $(218,476) |
| Colombian Peso | 281,184 | 4,386 |
| Euro | (40,840,707) | 637,669 |
| Hungarian Forint | 468,938 | (18,542) |
| Indonesian Rupiah | (580,570) | (3,618) |
| Mexican Peso | (92,947) | (8,803) |
| Malaysian Ringgit | 622,241 | 6,854 |
| Peruvian Nuevo Sol | 887,395 | 11,269 |
| Polish Zloty | (965,702) | (6,802) |
| Romanian Leu | 1,228,507 | (32,997) |
| Russian Ruble | (539,878) | (24,701) |
| South African Rand | (1,332,912) | (48,153) |
| Thai Baht | 357,019 | (3,556) |
| Turkish Lira | (883,766) | (11,378) |
| U.S. Dollar | 43,650,617 | 0 |
| Foreign currency forward contract asset | $ 283,152 | $ 283,152 |

### Swap Contracts

| Counterparty Credit Rating | Notional Value | Exposure |
|---|---|---|
| **Total return swaps - equity** | | |
| A | $ 124,698,370 | $4,256,043 |
| BBB+ | (18,173,588) | 1,508,248 |
| Total | $ 106,524,782 | $5,764,291 |
| | | |
| **Total return swaps - fixed income** | | |
| A | $1,094,529,923 | $7,290,626 |
| Total | $1,094,529,923 | $7,290,626 |
| | | |
| **Total return swaps - commodities** | | |
| A+ | $ 770,011,625 | $9,249,140 |
| A- | 105,208,859 | 53,108 |
| Total | $ 875,220,484 | $9,302,248 |

### Options Contracts

| | Expiration | Notional Value | Exposure |
|---|---|---|---|
| Written commodity call option | July 2016 | $(194,416,500) | $(10,870,600) |
| Purchased commodity put option | July 2016 | 161,804,700 | 212,395 |
| Total | | $ (32,611,800) | $(10,658,205) |

While the board has no formal policy specific to derivatives, the MOSERS investment implementation program, through its external managers, holds investments in futures contracts, swap contracts, options, and forward foreign currency exchange. MOSERS enters into these certain derivative instruments as investments primarily to enhance the performance and reduce the volatility of its portfolio. It enters swaps, futures, and options contracts to gain or hedge exposure to certain markets and to manage interest rate risk and enters into forward foreign currency exchange contracts primarily to hedge foreign currency exposure.

The notional values associated with these derivative instruments are generally not recorded in the financial statements; however, the amounts for the exposure on these instruments are recorded in the *Statements of Fiduciary Net Position* and the total changes in fair value for the year are included as investment income in the *Statements of Changes in Fiduciary Net Position*. For the year ended June 30, 2016, the change in fair value in the swap contracts resulted in a loss of $122.3 million of investment income. The change in fair value in the futures contracts resulted in $144.5 million of investment income. The change in fair value in the options contracts resulted in a loss of $10.6 million of investment income and the change in fair value of the foreign exchange contracts resulted in $0.2 million of investment income. MOSERS does not anticipate additional significant market risk from the derivative arrangements.

MOSERS could be exposed to risk if the counterparties to the contracts are unable to meet the terms of the contracts. MOSERS' investment managers seek to control this risk through counterparty credit evaluations and approvals, counterparty credit limits, and exposure monitoring procedures. MOSERS anticipates that the counterparties will be able to satisfy their obligations under the contracts. Investments in limited partnerships and commingled funds may include derivatives that are not shown in the derivative totals.

**Limited Partnerships**

Many of MOSERS' alternative investments are organized in the form of limited partnerships. In these partnerships, the manager is a general partner and the limited partners are the investors. Investments in limited partnerships are accounted for using the equity method of accounting and their earnings or losses for the period are included in investment income using the equity method.

As of June 30, 2016, MOSERS had contracts with over 98 limited partnerships across various types of alternative investments which collectively represent 52% of the total fund. A *Schedule of Limited Partnerships* follows on pages 45-46.

**Securities Lending Program**

The board of trustees' investment policy permits the pension trust funds to participate in a securities lending program. Fixed income, international equity and domestic equity securities of the pension trust funds are loaned to participating brokers who provide collateral in the form of cash, U.S. Treasury or government agency securities, or letters of credit issued by approved banks. Collateral must be provided in the amount of 102% of fair value for domestic loans and 105% of fair value for international loans. MOSERS does not have the authority to pledge or sell collateral securities without borrower default. Securities on loan at fiscal year end for cash collateral and on loan for noncash collateral are presented in the schedule on page 47. On June 30, 2016, MOSERS had no credit risk exposure to borrowers because the collateral amounts received exceeded amounts out on loan.

As of June 30, 2016, Deutsche Bank AG, New York branch, served as the agent for the fixed income, domestic equity and international equity securities lending programs. In this capacity, MOSERS reduces credit risk by allowing Deutsche Bank to lend these securities to a diverse group of dealers on behalf of MOSERS. Indemnification against dealer default is provided by Deutsche Bank AG, a "BBB+ rated" bank. With each of MOSERS' securities lending programs, the majority of loans are open and can be terminated on demand by either MOSERS or the borrower. Net income from the three lending programs is split on a 90/10 basis between MOSERS and Deutsche Bank, respectively.

Daily monitoring of securities that are on loan ensures proper collateralization levels and mitigates counterparty risk. Cash collateral from all three programs is commingled and invested in a separately managed short-term investment account for MOSERS. This cash collateral account is managed by Deutsche Bank. On June 30, 2016, the cash collateral account had a fair value of $14,258,587 and a weighted average maturity of one day. For all of the securities lending operational services, the custodian is paid an annual fee, which is netted against MOSERS' earnings in the securities lending programs managed by Deutsche Bank.

## Schedule of Limited Partnerships

| Partnership Name | Style | Investments at Fair Value as of June 30, 2016 |
|---|---|---|
| Actis Emerging Markets III | Emerging markets | $ 18,293,330 |
| Actis Global IV | Emerging markets | 22,910,735 |
| African Development Partners I, LLC | Emerging markets | 24,708,209 |
| African Development Partners II, LLC | Emerging markets | 8,630,634 |
| Alinda Infrastructure Fund I, LP | Infrastructure | 27,244,000 |
| American Industrial Partners Capital Fund V, LP | Corporate buyout | 36,380,982 |
| American Industrial Partners Capital Fund VI, LP | Corporate buyout | 1,060,580 |
| AQR DELTA Sapphire Fund, LP | Muti-strategy | 332,367,824 |
| AQR Global Risk Premium Fund IV, LP | Beta-balanced | 404,066,465 |
| AQR Style Premia Fund, LP | Muti-strategy | 57,709,964 |
| Axiom Asia Private Capital Fund II, LP | Emerging markets | 39,685,064 |
| Axiom Asia Private Capital Fund III, LP | Emerging markets | 36,209,237 |
| Axxon Brazil Private Equity Fund II B, LP | Emerging markets | 16,347,160 |
| Bayview Opportunity Domestic III b, LP | Distressed real estate debt | 50,803,928 |
| Bayview Opportunity Domestic, LP | Distressed real estate debt | 8,114,728 |
| Blackstone Real Estate Partners IV | Active real estate | 22,968,733 |
| Blackstone Real Estate Partners V | Active real estate | 53,455,962 |
| Blackstone Real Estate Partners VI | Active real estate | 43,204,033 |
| Blackstone Real Estate Partners VII | Active real estate | 70,957,651 |
| Blackstone Topaz Fund, LP | Multi-strategy – fund-of-funds | 348,119,832 |
| Blakeney Onyx, LP | Emerging markets | 51,220,393 |
| Bridgepoint Europe III A, LP | Corporate buyout | 14,517,857 |
| Bridgepoint Europe IV B, LP | Corporate buyout | 19,060,837 |
| Bridgewater Associates – All Weather, LLC | Beta-balanced | 483,712,947 |
| Bridgewater Associates – Diamond Ridge Fund, LLC | Global macro | 85,456,582 |
| Campbell Timber Fund II A, LP | Timberland | 988,067 |
| CarVal Investors CVI Global Value Fund A, LP – private debt | Distressed real estate debt | 10,200,000 |
| CarVal Investors CVI Global Value Fund A, LP – real estate | Distressed real estate debt | 10,200,000 |
| Castlelake Aviation II, LP | Special situations | 17,171,363 |
| Catalyst Fund Limited Partnership III | Canadian distressed debt | 59,501,213 |
| Catalyst Fund Limited Partnership IV | Canadian distressed debt | 24,387,763 |
| Catalyst Fund Limited Partnership V | Canadian distressed debt | 15,620,193 |
| Catterton Partners V, LP | Corporate buyout | 16,253,905 |
| Catterton Partners VI, LP | Corporate buyout | 22,331,129 |
| Catterton Partners VII, LP | Corporate buyout | 27,634,017 |
| Cornwall Domestic, LP | Multi-strategy | 70,233,163 |
| Davidson Kempner Institutional Partners, LP | Event driven | 26,355,338 |
| DDJ Capital Management – B IV Capital Partners, LP | Distressed debt | 29,089 |
| DRI Capital – LSRC | Intellectual property | 16,467,833 |
| DRI Capital – LSRC II | Intellectual property | 225,008 |
| EIG Energy Co-investment I | Energy (infrastructure) | 5,381,648 |
| EIG Energy Fund XIV, LP | Energy (mezzanine) | 5,298,075 |
| EIG Energy Fund XV, LP | Energy (mezzanine) | 32,526,090 |
| EIG Energy Fund XVI, LP | Energy (mezzanine) | 12,383,528 |
| Elliott International, Ltd. | Multi-strategy | 142,229,000 |
| Eton Park Fund, LP | Multi-strategy | 866,874 |
| Farallon Capital Institutional Partners, LP | Multi-strategy | 3,370,000 |
| Gaoling Fund, LP | Long/short equity | 97,979,140 |
| Garnet Sky Investors Company, Ltd. | Timberland | 116,132,316 |
| Gateway Energy & Resource Holdings, LLC | Energy (diversified) | 23,479,242 |

*Schedule of Limited Partnerships continued on page 46*

*Schedule of Limited Partnerships continued from page 45*

| Partnership Name | Style | Investments at Fair Value as of June 30, 2016 |
|---|---|---|
| GCM Equity Partners, LP | Long/short equity | 46,939,367 |
| Glenview Capital Opportunity Fund, LP | Long/short equity | 23,397,247 |
| Global Forest Partners GTI7 Institutional Investors Company, Ltd. | Timberland | 78,373,241 |
| HBK Merger Strategies Offshore Fund, Ltd. | Merger arbitrage | 52,905,567 |
| JLL Partners Fund V, LP | Corporate buyout | 13,269,317 |
| JLL Partners Fund VI, LP | Corporate buyout | 58,583,751 |
| King Street Capital, LP | Credit driven | 4,568,997 |
| King Street Capital, Ltd. | Credit driven | 463,886 |
| Linden Capital Partners Co-investment, LP | Corporate buyout | 10,588,235 |
| Linden Capital Partners II, LP | Corporate buyout | 33,799,706 |
| Mast Credit Opportunities I, LP | Credit driven | 49,671,221 |
| Merit Energy Partners F–II, LP | Energy (oil & gas) | 8,083,711 |
| MHR Institutional Partners II A, LP | Distressed debt | 28,461,085 |
| MHR Institutional Partners III, LP | Distressed debt | 30,191,084 |
| MHR Institutional Partners IV, LP | Distressed debt | 6,934,939 |
| Millennium Technology Value Partners Co-investment | Direct secondaries | 3,552,566 |
| Millennium Technology Value Partners II, LP | Direct secondaries | 14,675,981 |
| Moon Capital Global Equity Offshore Fund, Ltd. | Long/short equity | 820,251 |
| New Mountain Partners III, LP | Corporate buyout | 39,957,258 |
| Newport Pioneer, LLC | Multi-strategy – fund-of-funds | 1,209,487 |
| Oaktree European Credit Opportunities Fund, LP | European loans | 693,254 |
| OCM/GFI Power Opportunities Fund II, LP | Corporate buyout | 214,064 |
| OCM Opportunities Fund IV b, LP | Distressed debt | 339,601 |
| OCM Opportunities Fund VII b, LP | Distressed debt | 9,036,465 |
| OCM Opportunities Fund VIII b, LP | Distressed debt | 18,668,343 |
| OCM Power Opportunities Fund III, LP | Corporate buyout | 11,847,588 |
| OCM Real Estate Opportunities Fund III, LP | Active real estate | 2,007,811 |
| Perry Partners, LP | Multi-strategy | 42,042 |
| Pharo Macro Fund, Ltd. | Global macro | 107,174,309 |
| Resource Management Service – Wildwood Timberlands, LLC | Timberland | 73,982,899 |
| Silver Creek Special Opportunities Fund I, LP | Special situations – fund-of-funds | 10,762,022 |
| Silver Creek Special Opportunities Fund II, LP | Special situations – fund-of-funds | 16,920,825 |
| Silver Lake Partners II, LP | Corporate buyout | 6,086,464 |
| Silver Point Capital Fund, LP | Credit driven | 12,888 |
| Siris II Co-investment I | Corporate buyout | 3,198,821 |
| Siris II Co-investment II | Corporate buyout | 6,900,000 |
| Siris Partners II, LP | Corporate buyout | 16,811,390 |
| Siris Partners III, LP | Corporate buyout | 4,158,581 |
| Standard Investment Research Hedged Equity Fund, LP | Equity market neutral | 93,088,991 |
| StepStone Capital Buyout Fund I, LP | Corporate buyout – fund-of-funds | 6,543,365 |
| StepStone Capital Buyout Fund II, LP | Corporate buyout – fund-of-funds | 18,244,128 |
| StepStone Opportunities Fund II, LP | Private equity co-investment | 1,234,660 |
| The Veritas Capital Fund III, LP | Corporate buyout | 25,131,140 |
| The Veritas Capital Fund IV, LP | Corporate buyout | 43,974,372 |
| TPG-Axon Partners (Offshore), Ltd. | Long/short equity | 1,218,105 |
| Viking Global Equities III, Ltd. | Long/short equity | 155,547,959 |
| Visium Balanced Fund, LP | Long/short equity | 92,131,486 |
| Wellington Management – Spindrift Investors (Bermuda) | Long/short equity | 538,042 |
| Other Miscellaneous | Miscellaneous | 11,431 |
| | | $4,267,419,604 |

## Summary of Fair Value of Investments as of June 30, 2016

| | Pension Trust Funds | | Internal Service Funds | |
|---|---|---|---|---|
| | Investments at Cost Value | Investments at Fair Value | Investments at Cost Value | Investments at Fair Value |
| **Common stocks** | | | | |
| Out on loan | $ 12,604,827 | $ 14,601,839 | | |
| Not on securities loan | 284,713,143 | 272,299,932 | | |
| Total | 297,317,970 | 286,901,771 | | |
| International equities | 175,328,927 | 789,143,593 | | |
| Treasury bonds, notes and bills | 3,920,547,677 | 3,958,718,113 | | |
| Corporate bonds | 908,539 | 148,810 | | |
| Convertible bonds | 911,071 | 968,785 | | |
| Government bonds | 55,807,535 | 47,606,027 | | |
| Limited partnerships | 3,004,385,263 | 4,267,419,604 | | |
| REITs | 3,617 | 10,646 | | |
| Options | (83,620) | (10,658,205) | | |
| Foreign currencies | 7,602,952 | 7,821,688 | | |
| International corporate bonds | 1,528,964 | 1,263,124 | | |
| Repurchase agreements | 9,668,216 | 9,668,216 | $3,935,042 | $3,935,042 |
| Short-term investment funds | 2,468,694,173 | 2,468,694,173 | | |
| **Total investments** | | | | |
| Out on loan | 12,604,827 | 14,601,839 | | |
| Not on securities loan | 9,930,016,457 | 11,813,104,506 | 3,935,042 | 3,935,042 |
| Total | $9,942,621,284 | $11,827,706,345 | $3,935,042 | $3,935,042 |
| **Reconciliation to investments on *Statement of Fiduciary Net Position*** | | | | |
| Total from above | | $11,827,706,345 | | |
| Less short-term investments: | | | | |
| Repurchase agreements | | (9,668,216) | | |
| Short-term investment funds | | (2,454,472,796) | | |
| Less invested securities lending collateral: | | | | |
| Short-term investment funds | | (14,221,377) | | |
| Corporate bonds | | (37,210) | | |
| **Investments on *Statement of Fiduciary Net Position*** | | $ 9,349,306,746 | | |

*Due to space limitations and printing costs, a detailed listing of the investment holdings and transactions is not provided in this annual report; however, the detailed reports are available for review as an appendix to this report at the MOSERS office.*

### *(4) Capital Assets*

Office building, furniture, fixtures, and equipment costing $1,000 or more when acquired are recorded at cost at the time of acquisition and are reported net of accumulated depreciation. Improvements, which increase the useful life of the property, are also capitalized. Maintenance and repairs are charged to expense as incurred. Depreciation is computed using the straight-line method over the estimated useful life of the related assets according to the following guidelines:

- 5 years for furniture, fixtures, and equipment
- 40 years for building
- 5 years for software and licensing

Below are schedules of the capital asset account balances for the pension trust funds and the internal service funds – State of Missouri Deferred Compensation Plan as of June 30, 2015, and June 30, 2016, and changes to those account balances during the year ended June 30, 2016.

*Pension Trust Funds*

**Capital Asset Account**

| | Land | Building and Building Improvements | Furniture Fixtures and Equipment | Software and Licensing | Total Capital Assets |
|---|---|---|---|---|---|
| **Capital assets** | | | | | |
| Balances June 30, 2015 | $267,286 | $4,662,873 | $1,349,120 | $277,261 | $6,556,540 |
| Additions | 0 | 1,965 | 167,434 | 66,801 | 236,200 |
| Transfers | 0 | (380,501) | 0 | 380,501 | 0 |
| Deletions | 0 | 0 | (230,918) | 0 | (230,918) |
| Balances June 30, 2016 | 267,286 | 4,284,337 | 1,285,636 | 724,563 | 6,561,822 |
| **Accumulated depreciation** | | | | | |
| Balances June 30, 2015 | 0 | 1,572,730 | 1,131,009 | 151,010 | 2,854,749 |
| Depreciation expense | 0 | 148,140 | 109,262 | 126,512 | 383,914 |
| Deletions | 0 | 0 | (218,742) | 0 | (218,742) |
| Balances June 30, 2016 | 0 | 1,720,870 | 1,021,529 | 277,522 | 3,019,921 |
| Net capital assets June 30, 2016 | $267,286 | $2,563,467 | $ 264,107 | $447,041 | $3,541,901 |

*Internal Service Funds*

**Capital Asset Account**

| | Leasehold Improvements | Furniture Fixtures and Equipment | Software and Licensing | Total Capital Assets |
|---|---|---|---|---|
| **Capital assets** | | | | |
| Balances June 30, 2015 | $3,880 | $6,319 | $4,950 | $15,149 |
| Additions | 0 | 1,197 | 0 | 1,197 |
| Balances June 30, 2016 | 3,880 | 7,516 | 4,950 | 16,346 |
| **Accumulated depreciation** | | | | |
| Balances June 30, 2015 | 970 | 4,444 | 2,388 | 7,802 |
| Depreciation expense | 970 | 698 | 990 | 2,658 |
| Balances June 30, 2016 | 1,940 | 5,142 | 3,378 | 10,460 |
| Net capital assets June 30, 2016 | $1,940 | $2,374 | $1,572 | $ 5,886 |

### *(5) Employers' Net Pension Liability*

The components of the net pension liability as of June 30, 2016, are shown in the *Schedule of Employers' Net Pension Liability* below.

**Schedule of Employers' Net Pension Liability**

| | MSEP | Judicial Plan |
|---|---|---|
| Total pension liability | $12,751,162,753 | $547,621,617 |
| Less: MOSERS fiduciary net position | 8,109,161,214 | 132,056,351 |
| Employers' net pension liability | $ 4,642,001,539 | $415,565,266 |
| Plan net position as a percentage of the total pension liability | 63.60% | 24.11% |
| Covered employee payroll | $ 1,921,528,936 | $ 57,421,016 |
| Employers' net pension liability as a percentage of employee covered payroll | 241.58% | 723.72% |

Actuarial valuation of an ongoing plan involves estimates of the reported amounts and assumptions about the probability of occurrence of events far into the future. Examples include assumptions about future employment mortality and future salary increases. Amounts determined regarding the net pension liability are subject to continual revision as actual results are compared with past expectations and new estimates are made about the future. An experience study covering the five-year period ended June 30, 2015 was performed in 2016. The *Schedule of Changes in Employers' Net Pension Liability* presents multi-year trend information about whether the plan fiduciary net positions are increasing or decreasing over time relative to the total pension liability. These schedules are presented in the *Required Supplementary Information* on page 52. The total pension liability as of June 30, 2016, is $12,751,162,753 for MSEP and $547,621,617 for the Judicial Plan based on an actuarial valuation performed as of June 30, 2016, and a measurement date of June 30, 2016 using generally accepted actuarial procedures.

#### Changes to Amortization Period

In June 2013, the board approved a change to the period over which unfunded actuarial accrued liabilities are amortized to reduce the amortization period from an open 30 years to a closed 30 years beginning July 1, 2014. This will continue to reduce by one year for each subsequent annual valuation until the period reaches one year. The board intends to reexamine the amortization period in connection with the 2030 actuarial valuation to determine whether or not it should be reduced below 15 years.

The *Summary of Actuarial Assumptions* below applies to all periods included in the measurement of the total pension liability.

**Summary of Actuarial Assumptions**

| | MSEP | Judicial Plan |
|---|---|---|
| Valuation date | June 30, 2016 | June 30, 2016 |
| Actuarial cost method | Entry age normal | Entry age normal |
| Amortization method | Level percent | Level percent |
| Remaining amortization period | 28 years closed | 28 years closed |
| Asset valuation method | 5-year rolling smoothed +25/-20% market corridor | 5-year rolling smoothed +25/-20% market corridor |
| Investment rate of return | 7.65% | 7.65% |
| Projected salary increases | 3.25-8.75% | 3.0-5.2% |
| Rate of payroll growth | 3.00% | 3.00% |
| COLAs | 4.00%* | 4.00%* |
| Price inflation | 2.50% | 2.50% |
| Remaining amortization period | 28 years | 28 years |

* *On a compound basis, 4.00% for the first 12 years, 3.06% for the 13th year, and 2.00% per year thereafter. When no minimum COLA is in effect, price inflation is assumed to be 2.50% and the annual COLA is assumed to be 2.00% (80% of 2.50%), on a compounded basis.*

*Mortality rates are based on the RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%. The pre-retirement mortality table used was the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females.*

The discount rate used to measure the total pension liability was 7.65%. The projection of cash flows used to determine the discount rate assumed that contributions from participating employers will be made using the actuarially determined rates. Based on those assumptions, MOSERS' fiduciary net position was projected to be available to make all the projected future benefit payments of the current plan members. As a result, the long-term expected rate of return on pension plan investments of 7.65% was applied to all periods of projected benefit payments to determine the total pension liability.

The table below presents the net pension liability of the state of Missouri as of June 30, 2016, calculated using the discount rate of 7.65%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1.0% lower (6.65%) or 1.0% higher (8.65%) than the current rate.

**Sensitivity of Net Pension Liability to Changes in the Discount Rate**

| Employers' net pension liability | 1% Decrease (6.65%) | Current Discount Rate (7.65%) | 1% Increase (8.65%) |
|---|---|---|---|
| MSEP | $6,112,408,312 | $4,642,001,539 | $3,409,192,306 |
| Judicial Plan | 471,242,206 | 415,565,266 | 367,891,602 |

The funding status of the plans and *Employer Schedule of Funding Progress* can be found in the *Actuarial Section* on page 100.

## *(6) Contributions and Reserves*

The MSEP and the Judicial Plan are pension plans covering substantially all state of Missouri employees and judges. The state of Missouri and its component employers are obligated by state law to make required contributions to the plans. The required contributions are expressed as a level percentage of covered payroll and are actuarially determined using an individual entry-age normal actuarial cost method. Contributions began July 2014 at the contribution rate determined by the June 30, 2013 actuarial valuation (16.97% and 58.45% for MSEP and Judicial Plan, respectively) and will continue at or above that rate until the actuarial funding of the plans is at least 80%. The unfunded accrued liabilities are amortized over a closed 28-year period as of June 30, 2016. MSEP 2011 employees and Judicial Plan 2011 members are required to contribute 4% of their pay. Costs of administering the plans are financed from the contributions to the pension trust funds and investment earnings.

## *(7) Other Post-Employment Benefits (OPEB)*

In addition to the retirement benefits provided through MOSERS, the state of Missouri also funds, either partially or in its entirety, OPEB for eligible retirees as follows:

### Retiree Life Insurance

Members who retire on or after October 1, 1985, are eligible for $5,000 of state-sponsored basic life insurance coverage if they retire directly from active employment. As of June 30, 2016, 25,226 retirees were participating in the program. This insured defined benefit coverage is financed on a percentage of payroll (.115%) and is purchased as a group policy through competitive bids and is currently administered through The Standard insurance company. The cost for the year ended June 30, 2016, was $1,872,742. Premiums are contributed entirely by the state and its component employers as provided by Section 104.515, RSMo.

Retirees of the Department of Labor and Industrial Relations (DOLIR), who retired prior to January 1, 1996, are eligible for state-sponsored insured defined benefit insurance coverage in the same amount of coverage they were receiving through the DOLIR. As of June 30, 2016, 214 retirees were participating in the program. The coverage for this closed group is purchased as a group policy through competitive bids at a current cost of $2.07 per thousand dollars of coverage, per month, per eligible participant ($27,206 for the year ended June 30, 2016). Premiums are paid entirely by the DOLIR as provided by Section 228.225, RSMo. Retirees of the DOLIR who retired on or after January 1, 1996, are eligible for $5,000 of state-sponsored life insurance coverage if they retire directly from active employment. They are included in the group described in the preceding paragraph.

### Long-Term Disability Insurance (LTD)

MOSERS provides LTD coverage for eligible members and generally includes those active members of MOSERS' retirement plans who do not have other disability coverage and are not yet eligible to receive normal (unreduced) retirement benefits. There were 32,915 members covered under the program as of June 30, 2016. This insured defined benefit coverage is financed on a percentage of covered payroll (0.55%). Purchased as group policy through competitive bids, LTD is administered by The Standard insurance company. The cost for the year ended June 30, 2016, was $7,959,584. Premiums are contributed by the state and its component employers as provided for by Section 104.515, RSMo.

### Post-Employment Retiree Health Care

MOSERS participates in a cost-sharing multiple-employer defined benefit post-employment health care plan administered by the Missouri Consolidated Health Care Plan (MCHCP). The plan provides medical benefits to retirees of participating governmental entities. Retirees who had medical insurance coverage for six months immediately prior to termination or state-sponsored medical coverage since the effective date of the last enrollment period (or since first eligible), before they are eligible to retire, may continue coverage into retirement.

MCHCP issues a publicly available financial report that includes financial statements and required supplementary information for the post-employment health care plan. The report may be obtained online at *www.mchcp.org* or by calling (800) 487-0771 or writing to MCHCP, 832 Weathered Rock Court, P.O. Box 104355, Jefferson City, MO 65110-4355.

Plan funding requests are actuarially determined, approved by the MCHCP Board of Trustees and subject to appropriation by the Missouri General Assembly. MOSERS contributed $257,003 in FY14, $267,315 in FY15, and $260,223 in FY16 in accordance with the state's funding policy toward the annual required contributions for post-employment retiree health care, which equaled MOSERS' required contribution each year.

## *(8) Plan Termination*

MOSERS and its related plans are administered in accordance with Missouri statutes. Plans can only be terminated by an amendment to these statutes by the Missouri legislature.

On April 26, 2005, Senate Bill 202 was enacted, which terminated the Administrative Law Judges and Legal Advisors' Plan (ALJLAP) for new hires only. Under this legislation, individuals who assume a position after April 26, 2005, who would have otherwise been covered by the ALJLAP, will instead participate in the MSEP or the MSEP 2000, depending on when they initially became state employees. For fiscal years 2005 and after, all liabilities and assets of the ALJLAP were transferred and combined with the MSEP. Membership totals for the ALJLAP are included in the MSEP in all relevant sections of this report.

## *(9) Commitments*

As of June 30, 2016, MOSERS has $457,681,747 and €868,751 unfunded commitments in the illiquids asset class.

## *(10) Contingencies*

There were no contingencies which would have a material impact on the financial statements at June 30, 2016.

## *(11) Risk Management*

MOSERS is exposed to various risks of loss related to natural disasters, errors, and omissions, loss of assets, torts, etc. MOSERS has chosen to cover such losses through the purchase of commercial insurance to help mitigate some of the exposure to those risks. There have been no material insurance claims filed or paid during the past three years.

*Pension Trust Funds*

## Schedule of Changes in Employers' Net Pension Liability | For Years Ended June 30, 2014, 2015, and 2016*

### MSEP

| | 2014 | 2015 | 2016 |
|---|---|---|---|
| **Total pension liability** | | | |
| Service cost | $ 158,116,026 | $ 150,412,577 | $ 149,021,755 |
| Interest on the total pension liability | 869,878,195 | 896,451,618 | 913,877,923 |
| Difference between expected and actual experience | 12,376,237 | (27,983,267) | 61,150,083 |
| Assumption changes | 0 | (57,568,553) | 656,805,085 |
| Benefit payments | (679,014,251) | (725,786,536) | (753,512,304) |
| Refunds | (1,421,856) | (2,479,264) | (3,798,199) |
| **Net change in total pension liability** | 359,934,351 | 233,046,575 | 1,023,544,343 |
| **Total pension liability - beginning** | 11,134,637,484 | 11,494,571,835 | 11,727,618,410 |
| **Total pension liability - ending (a)** | $11,494,571,835 | $11,727,618,410 | $12,751,162,753 |
| **Plan fiduciary net position** | | | |
| Employer contributions | $ 326,370,336 | $ 329,752,832 | $ 329,957,369 |
| Employee contributions | 14,025,328 | 18,099,455 | 21,684,920 |
| Pension plan net investment income (loss) | 1,485,159,992 | (237,070,529) | 1,740,269 |
| Benefit payments | (679,014,251) | (725,786,536) | (753,512,304) |
| Refunds | (1,421,856) | (2,479,264) | (3,798,199) |
| Pension plan administrative expense | (7,336,922) | (8,077,692) | (8,489,375) |
| Other | 5,161,629 | 5,434,820 | 4,923,622 |
| **Net change in plan fiduciary net position** | 1,142,944,256 | (620,126,914) | (407,493,698) |
| **Plan fiduciary net position - beginning** | 7,993,837,570 | 9,136,781,826 | 8,516,654,912 |
| **Plan fiduciary net position - ending (b)** | 9,136,781,826 | 8,516,654,912 | 8,109,161,214 |
| **Net pension liability - ending (a)-(b)** | $ 2,357,790,009 | $ 3,210,963,498 | $ 4,642,001,539 |
| **Plan fiduciary net position as a percentage of total pension liability** | 79.49% | 72.62% | 63.60% |
| **Covered employee payroll** | $ 1,902,719,928 | $ 1,918,527,768 | $ 1,921,528,936 |
| **Net pension liability as a percentage of covered employee payroll** | 123.92% | 167.37% | 241.58% |

** Schedule is intended to show information for 10 years. Additional years will be displayed as they become available.*

REQUIRED SUPPLEMENTARY INFORMATION

*Pension Trust Funds*

## Schedule of Changes in Employers' Net Pension Liability | For Years Ended June 30, 2014, 2015, and 2016*

### Judicial Plan

| | 2014 | 2015 | 2016 |
|---|---|---|---|
| **Total pension liability** | | | |
| Service cost | $ 8,990,293 | $ 10,613,686 | $ 10,932,097 |
| Interest on the total pension liability | 34,013,615 | 36,161,612 | 37,755,240 |
| Difference between expected and actual experience | 13,360,614 | 5,103,664 | (5,036,696) |
| Assumption changes | 0 | 0 | 53,991,379 |
| Benefit payments | (29,406,625) | (31,245,906) | (32,979,706) |
| Refunds | 0 | 0 | (10,008) |
| **Net change in total pension liability** | 26,957,897 | 20,633,056 | 64,652,306 |
| **Total pension liability - beginning** | 435,378,358 | 462,336,255 | 482,969,311 |
| **Total pension liability - ending (a)** | $462,336,255 | $482,969,311 | $547,621,617 |
| **Plan fiduciary net position** | | | |
| Employer contributions | $ 29,264,877 | $ 32,696,686 | $ 33,642,498 |
| Employee contributions | 294,810 | 488,193 | 661,206 |
| Pension plan net investment income (loss) | 17,199,701 | (3,610,352) | 28,081 |
| Benefit payments | (29,406,625) | (31,245,906) | (32,979,706) |
| Refunds | 0 | 0 | (10,008) |
| Pension plan administrative expense | (105,693) | (123,015) | (136,983) |
| Other | 4,195,049 | 0 | 0 |
| **Net change in plan fiduciary net position** | 21,442,119 | (1,794,394) | 1,205,088 |
| **Plan fiduciary net position - beginning** | 111,203,538 | 132,645,657 | 130,851,263 |
| **Plan fiduciary net position - ending (b)** | 132,645,657 | 130,851,263 | 132,056,351 |
| **Net pension liability - ending (a)-(b)** | $329,690,598 | $352,118,048 | $415,565,266 |
| **Plan fiduciary net position as a percentage of total pension liability** | 28.69% | 27.09% | 24.11% |
| **Covered employee payroll** | $ 49,587,936 | $ 55,656,457 | $ 57,421,016 |
| **Net pension liability as a percentage of covered employee payroll** | 664.86% | 632.66% | 723.72% |

** Schedule is intended to show information for 10 years. Additional years will be displayed as they become available.*

*Pension Trust Funds*

# **Schedule of Employer Contributions** | Last Ten Years

## MSEP

| Year Ended June 30 | Actuarially Determined Contribution | Contributions in Relation to the Actuarially Determined Contribution** | Contribution Deficiency (Excess) | Covered Employee Payroll | Contributions as a Percentage of Covered Payroll* |
|---|---|---|---|---|---|
| 2007 | $239,488,751 | $239,488,751 | $0 | $1,846,643,330 | 13.0% |
| 2008 | 249,770,156 | 249,770,156 | 0 | 1,916,527,398 | 13.0 |
| 2009 | 252,105,008 | 252,105,008 | 0 | 2,002,402,087 | 12.6 |
| 2010 | 251,226,187 | 251,226,187 | 0 | 1,945,095,321 | 12.9 |
| 2011 | 263,418,048 | 263,418,048 | 0 | 1,875,569,816 | 14.0 |
| 2012 | 263,373,924 | 263,373,924 | 0 | 1,864,069,493 | 14.1 |
| 2013 | 274,655,284 | 274,655,284 | 0 | 1,880,212,950 | 14.6 |
| 2014 | 326,370,336 | 326,370,336 | 0 | 1,902,719,928 | 17.2 |
| 2015 | 329,752,832 | 329,752,832 | 0 | 1,918,527,768 | 17.2 |
| 2016 | 329,957,369 | 329,957,369 | 0 | 1,921,528,936 | 17.2 |

## Judicial Plan

| Year Ended June 30 | Actuarially Determined Contribution | Contributions in Relation to the Actuarially Determined Contribution** | Contribution Deficiency (Excess) | Covered Employee Payroll | Contributions as a Percentage of Covered Payroll* |
|---|---|---|---|---|---|
| 2007 | $23,745,467 | $23,745,467 | $0 | $40,846,581 | 58.1% |
| 2008 | 26,215,309 | 26,215,309 | 0 | 44,542,530 | 58.9 |
| 2009 | 27,725,882 | 27,725,882 | 0 | 45,505,512 | 60.9 |
| 2010 | 27,029,198 | 27,029,198 | 0 | 46,112,730 | 58.6 |
| 2011 | 27,702,682 | 27,702,682 | 0 | 45,888,020 | 60.4 |
| 2012 | 26,324,526 | 26,324,526 | 0 | 45,835,501 | 57.4 |
| 2013 | 28,330,649 | 28,330,649 | 0 | 48,697,726 | 58.2 |
| 2014 | 29,264,877 | 29,264,877 | 0 | 49,587,936 | 59.0 |
| 2015 | 32,696,686 | 32,696,686 | 0 | 55,656,457 | 58.7 |
| 2016 | 33,642,498 | 33,642,498 | 0 | 57,421,016 | 58.6 |

* *Actuarial contribution rate shown is the actual employer contribution made divided by payroll in force on May 31 reported for valuation. This rate as computed may vary from the board's certified employer contribution rate due to the fluctuations in membership and pay during the year.*

** *Since the percent of payroll contribution rate was applied to pension payroll during the fiscal year, the actuarially determined contribution is equal to the actual contribution.*

*REQUIRED SUPPLEMENTARY INFORMATION*

*Pension Trust Funds*

## Schedule of Annual Money-Weighted Rate of Return on Investments*

| Year Ended June 30 | Annual Money-Weighted Rate of Return — Net of Investment Expense |
|---|---|
| 2014 | 19.25% |
| 2015 | (2.60) |
| 2016 | 0.08 |

* *Schedule is intended to show information for 10 years. Additional years will be displayed as they become available.*

*Pension Trust Funds*

## Notes to the Schedules of Required Supplementary Information | Last Ten Years

### Actuarial Methods and Assumptions for Valuations Performed as of June 30, 2016

The entry-age actuarial cost method of valuation is used in determining liabilities and normal cost. Regular actuarial valuations provide valuable information about the composite change in the unfunded actuarial accrued liabilities (whether or not the liabilities are increasing or decreasing, and by how much). Since the future cannot be predicted with precision, actual experience is expected to differ from assumed experience. Differences occurring in the past between assumed experience and actual experience (actuarial gains and losses) become part of actuarial accrued liabilities. Unfunded actuarial accrued liabilities are amortized to produce payments (principal and interest), which are expressed as a percent of payroll. A closed 28-year amortization period was used for the June 30, 2016 valuations. The actuarial value of assets is based on a method that fully recognizes expected investment returns and averages unanticipated market returns over a 5-year period. The corridor limit is currently 80% to 125%.

The investment return rate assumption was reduced from 8.0% as of June 30, 2015, to 7.65% per year as of June 30, 2016, compounded annually (net of investment expenses). The price inflation assumption used was 2.5% per year. Projected salary assumptions were 3.25% to 8.75% for MSEP and 3.0% to 5.2% for the Judicial Plan. The assumption used for annual post-retirement benefit increases (COLA) is 4.0% (on a compound basis) when a minimum COLA is in effect. When no minimum COLA is in effect, price inflation is assumed to be 2.5% and the annual COLA is assumed to be 2.0% (80% of 2.5%), on a compound basis.

**2007** | The actuarial valuations as of June 30, 2007, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2009.

| | Amount | Percent of Payroll |
|---|---|---|
| **MSEP** | | |
| Change in benefit assumptions or methods | $ (369,329) | (0.02)% |
| Experience and nonrecurring items | (5,355,266) | (0.29) |
| **Judicial Plan** | | |
| Change in benefit assumptions or methods | (273,672) | (0.67) |
| Experience and nonrecurring items | 853,694 | 2.09 |

**2008** | The actuarial valuations as of June 30, 2008, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2010.

| | Amount | Percent of Payroll |
|---|---|---|
| **MSEP** | | |
| Change in benefit assumptions or methods | $4,791,318 | 0.25% |
| Experience and nonrecurring items | (574,958) | (0.03) |
| **Judicial Plan** | | |
| Change in benefit assumptions or methods | (547,873) | (1.23) |
| Experience and nonrecurring items | (160,353) | (0.36) |

**2009** | The actuarial valuations as of June 30, 2009, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2011.

| | Amount | Percent of Payroll |
|---|---|---|
| **MSEP** | | |
| State of Missouri general pay freeze | $ (4,405,285) | (0.22)% |
| Experience and nonrecurring items | 55,466,538 | 2.77 |
| Change in valuation asset corridor from +/- 20% to +/- 30% | (29,835,791) | (1.49) |
| **Judicial Plan** | | |
| State of Missouri general pay freeze | 350,392 | 0.77 |
| Experience and nonrecurring items | 496,010 | 1.09 |
| Change in valuation asset corridor from +/- 20% to +/- 30% | (141,067) | (0.31) |

*REQUIRED SUPPLEMENTARY INFORMATION*

## 2010

The actuarial valuations as of June 30, 2010, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2012.

| | Amount | Percent of Payroll |
|---|---|---|
| **MSEP** | | |
| State of Missouri general pay freeze | $ (2,528,624) | (0.13)% |
| Addition of new tier of benefits effective 1-1-2011 | (17,311,348) | (0.89) |
| Experience and nonrecurring items | 25,480,749 | 1.31 |
| Change in timing of contributions | (2,528,624) | (0.13) |
| **Judicial Plan** | | |
| State of Missouri general pay freeze | (308,955) | (0.67) |
| Addition of new tier of benefits effective 1-1-2011 | (493,406) | (1.07) |
| Experience and nonrecurring items | 438,071 | 0.95 |
| Change in timing of contributions | (894,587) | (1.94) |

## 2011

The actuarial valuations as of June 30, 2011, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2013.

| | Amount | Percent of Payroll |
|---|---|---|
| **MSEP** | | |
| State of Missouri general pay freeze | $(6,376,937) | (0.34)% |
| Experience and nonrecurring items | 17,630,356 | 0.94 |
| Change in normal cost due to increased participants in MSEP 2011 | (2,250,684) | (0.12) |
| **Judicial Plan** | | |
| State of Missouri general pay freeze | (293,683) | (0.64) |
| Experience and nonrecurring items | 289,095 | 0.63 |
| Change in normal cost due to increased participants in Judicial Plan 2011 | (169,786) | (0.37) |

## 2012

The actuarial valuations as of June 30, 2012, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2014.

| | Amount | Percent of Payroll |
|---|---|---|
| **MSEP** | | |
| Change in assumptions or methods | $21,623,206 | 1.16% |
| Experience and nonrecurring items | 25,537,752 | 1.37 |
| **Judicial Plan** | | |
| Change in assumptions or methods | 948,795 | 2.07 |
| Experience and nonrecurring items | 320,849 | 0.70 |

## 2013

The actuarial valuations as of June 30, 2013, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2015.

| | Amount | Percent of Payroll |
|---|---|---|
| **MSEP** | | |
| Change in benefit assumptions or methods | $18,990,151 | 1.01% |
| Experience and nonrecurring items | (376,043) | (0.02) |
| **Judicial Plan** | | |
| Change in benefit assumptions or methods | (603,852) | (1.24) |

## 2014

The actuarial valuations as of June 30, 2014, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2016.

| | Amount | Percent of Payroll |
|---|---|---|
| **MSEP** | | |
| Recognition of asset gains | $16,173,119 | 0.85% |
| Experience and nonrecurring items | (1,141,632) | (0.06) |
| Change in normal cost due to increased participants in MSEP 2011 and experience | 4,376,256 | 0.23 |
| **Judicial Plan** | | |
| Change in normal cost due to increased participants in Judicial Plan 2011 and experience | (510,756) | (1.03) |
| Anticipated change in salary levels | (1,180,193) | (2.38) |

## 2015

The actuarial valuations as of June 30, 2015 reflected the following changes to the computed actuarial determined contribution (ADC) rates for fiscal year ending June 30, 2017. Actual contribution rate differs from computed ADC due to minimum funding policy adopted by the board in September 2014, requiring contributions to be no less than 16.97% of covered payroll for MSEP and 58.45% for Judicial Plan until the funding ratio is at least 80% for each plan.

| | Amount | Percent of Payroll |
|---|---|---|
| **MSEP** | | |
| Recognition of asset losses | $ 7,674,111 | 0.40% |
| Experience and nonrecurring items | 4,412,614 | 0.23 |
| Change in normal cost due to increased participants in MSEP 2011 and experience | (4,604,467) | (0.24) |
| Liability (gain) loss | (1,918,528) | (0.10) |
| Change in benefit assumptions or methods | 3,069,644 | 0.16 |
| Minimum funding policy contribution | (1,151,117) | (0.06) |
| **Judicial Plan** | | |
| Recognition of asset losses | 116,879 | 0.21 |
| Experience and nonrecurring items | 417,423 | 0.75 |
| Change in normal cost due to increased participants in Judicial Plan 2011 and experience | (372,898) | (0.67) |
| Liability (gain) loss | 361,767 | 0.65 |
| Minimum funding policy contribution | (122,444) | (0.22) |

## 2016

The actuarial valuations as of June 30, 2016 reflected the following changes to the computed actuarial determined contribution (ADC) rates for fiscal year ending June 30, 2018.

| | Amount | Percent of Payroll |
|---|---|---|
| **MSEP** | | |
| Recognition of asset losses | $ 21,136,818 | 1.10% |
| Change in normal cost due to increased participants in MSEP 2011 and experience | (3,843,058) | (0.20) |
| Liability (gain) loss | 3,843,058 | 0.20 |
| Projected payroll higher than expected | (192,153) | (0.01) |
| Change in benefit assumptions or methods | 39,583,496 | 2.06 |
| Minimum funding policy contribution | (768,612) | (0.04) |
| **Judicial Plan** | | |
| Recognition of asset losses | 9,415,492 | 0.49 |
| Experience and nonrecurring items | (13,258,550) | (0.69) |
| Change in benefit assumptions or methods | 130,856,121 | 6.81 |
| Change in normal cost due to increased participants in Judicial 2011 and experience | (1,345,070) | (0.07) |
| Minimum funding policy contribution | (4,035,211) | (0.21) |

*ADDITIONAL FINANCIAL INFORMATION*

*Pension Trust Funds*

## Schedules of Investment Expenses

| Investing Activity | MSEP | Judicial Plan | Total |
|---|---|---|---|
| **Investment management and administrative fees** | | | |
| Actis Emerging Markets III & IV – private equity | $1,446,657 | $ 23,343 | $1,470,000 |
| Aeolus Property Catastrophe, LP – hedge funds | 21,058 | 340 | 21,398 |
| African Development Partners I & II, LLC – private equity | 174,785 | 2,820 | 177,605 |
| Alinda Infrastructure Fund I, LP – private equity | 419,557 | 6,770 | 426,327 |
| American Industrial Partners IV & V – private equity | 1,634,236 | 26,370 | 1,660,606 |
| AQR Absolute Return Institutional Fund, LP – hedge funds | 3,245,833 | 52,374 | 3,298,207 |
| AQR DELTA Sapphire Fund, LP – hedge funds | 4,277,049 | 69,014 | 4,346,063 |
| AQR Global Risk Premium Fund IV, LP – beta-balanced | 2,390,779 | 38,577 | 2,429,356 |
| AQR Style Premia Fund, LP – beta-balanced | 1,104,530 | 17,823 | 1,122,353 |
| Axiom Asia Private Capital Fund II & III, LP – private equity | 1,553,195 | 25,062 | 1,578,257 |
| Axxon Brazil Private Equity Fund II – private equity | 985,168 | 15,897 | 1,001,065 |
| Bayview Opportunity Domestic, LP – high yield | 428,780 | 6,919 | 435,699 |
| Bayview Opportunity Domestic III, LP – real estate | 1,769,911 | 28,559 | 1,798,470 |
| BlackRock Financial Management Bank Loans – high yield | 1,509 | 24 | 1,533 |
| Blackstone Real Estate Partners IV, V, VI, & VII – real estate | 1,275,817 | 20,586 | 1,296,403 |
| Blackstone Topaz Fund, LP – hedge funds | 4,605,122 | 74,307 | 4,679,429 |
| Blakeney Onyx, LP – emerging markets | 1,586,007 | 25,592 | 1,611,599 |
| Brevan Howard, LP – hedge funds | 1,489,300 | 24,031 | 1,513,331 |
| Bridgepoint Europe III A & IV B, LP – private equity | 377,333 | 6,089 | 383,422 |
| Bridgewater Associates – All Weather, LLC – beta-balanced | 2,020,757 | 32,607 | 2,053,364 |
| Bridgewater Associates Diamond Ridge Fund, LLC – hedge funds | 3,495,122 | 56,397 | 3,551,519 |
| Campbell Timber Fund II A, LP – timber | 479,975 | 7,745 | 487,720 |
| CarVal Investors CVI Global Value Fund A, LP – real estate | 54,524 | 880 | 55,404 |
| CarVal Investors CVI Global Value Fund A, LP – private debt | 54,524 | 880 | 55,404 |
| Castlelake Aviation II – private equity | 1,500,044 | 24,204 | 1,524,248 |
| Catalyst Fund Limited Partnership III, IV & V – private debt | 2,997,010 | 48,359 | 3,045,369 |
| Catterton Partners V, VI, & VII, LP – private equity | 1,970,428 | 31,794 | 2,002,222 |
| Cornwall Domestic, LP – hedge funds | 3,048,137 | 49,184 | 3,097,321 |
| Davidson Kempner Institutional Partners, LP – hedge funds | 967,450 | 15,611 | 983,061 |
| DRI Capital LSRC & LSRC II – private equity | 393,061 | 6,342 | 399,403 |
| EIG Energy Fund XIV, LP – real estate | 931,619 | 15,032 | 946,651 |
| EIG Energy Fund XV, LP – private equity | (1,577,365) | (25,452) | (1,602,817) |
| Elliott International, Ltd. – hedge funds | 3,667,814 | 59,183 | 3,726,997 |
| Empyrean Capital Fund, LP – hedge funds | (65,475) | (1,057) | (66,532) |
| Farallon Capital Institutional Partners, LP – hedge funds | (153,893) | (2,483) | (156,376) |
| Gaoling Fund, LP – hedge funds | 232,169 | 3,746 | 235,915 |
| Garnet Sky Investors Company, Ltd. – timber | (1,266,166) | (20,431) | (1,286,597) |
| Gateway Energy & Resource Holdings, LLC – real estate | 288,057 | 4,648 | 292,705 |
| GCM Equity Partners, LP – hedge funds | 10,257 | 166 | 10,423 |
| Glenview Institutional Partners & Glenview Capital Opportunity Fund, LP – hedge funds | (1,721,704) | (27,781) | (1,749,485) |
| Global Forest Partners GTI7 Institutional Investors Company, Ltd. – timber | 742,742 | 11,985 | 754,727 |
| Harvest Fund Advisors – real estate | 908,438 | 14,658 | 923,096 |
| HBK Merger Strategies Offshore Fund, Ltd. – hedge funds | 1,469,342 | 23,709 | 1,493,051 |
| HBK Offshore Fund, Ltd. – hedge funds | 189,479 | 3,057 | 192,536 |
| JLL Partners V & VI, LP – private equity | 1,255,509 | 20,259 | 1,275,768 |
| King Street Capital, LP – hedge funds | 341,260 | 5,507 | 346,767 |
| Linden Capital Partners II, LP – private equity | 664,931 | 10,729 | 675,660 |
| Mast Credit Opportunities I, LP – hedge funds | 424,850 | 6,855 | 431,705 |
| Merit Energy Partners F-II, LP – real estate | 247,033 | 3,986 | 251,019 |
| MHR Institutional Partners IIA, III & IV, LP – private debt | (9,287,951) | (149,869) | (9,437,820) |

*Schedule of Investment Expenses continued on page 60*

*ADDITIONAL FINANCIAL INFORMATION*

*Schedule of Investment Expenses continued from page 59*

| Investing Activity | MSEP | Judicial Plan | Total |
|---|---|---|---|
| Millennium Technology Partners II, LP – private equity | 226,557 | 3,656 | 230,213 |
| New Mountain Partners III, LP – private equity | 3,838,597 | 61,939 | 3,900,536 |
| NISA Investment Advisors, LLC – beta-balanced | 4,612,310 | 74,423 | 4,686,733 |
| OCM/GFI Power Opportunities Fund II & III, LP – private equity | 677,630 | 10,934 | 688,564 |
| OCM Opportunities Fund IV b, VII b & VIII b, LP – private debt | 69,989 | 1,129 | 71,118 |
| OCM Real Estate Opportunities Fund III, LP – real estate | (358,220) | (5,780) | (364,000) |
| Perry Capital – hedge funds | 516 | 8 | 524 |
| Pharo Macro Fund, Ltd. – hedge funds | 3,078,210 | 49,669 | 3,127,879 |
| Resource Management Service - Wildwood Timberlands, LLC – timber | 394,299 | 6,362 | 400,661 |
| Silchester International Investors – int'l developed equity | 4,111,080 | 66,336 | 4,177,416 |
| Silver Lake Partners II, LP – private equity | 497,235 | 8,023 | 505,258 |
| SIR Hedged Equity Fund, Ltd. – hedge funds | 3,672,928 | 59,266 | 3,732,194 |
| Siris Partners II, LP – private equity | 606,155 | 9,781 | 615,936 |
| Siris Partners III, LP – private equity | 668,911 | 10,793 | 679,704 |
| State Street Global Advisors – emerging markets | 189,526 | 3,058 | 192,584 |
| StepStone Capital Buyout Fund I & II, LP – private equity | 106,847 | 1,724 | 108,571 |
| StepStone Opportunities Fund II, LP – private equity | 80,388 | 1,297 | 81,685 |
| Stone Harbor Investment Partners, LP – emerging markets | 275,147 | 4,440 | 279,587 |
| TPG-Axon Partners (Offshore), Ltd. – hedge funds | (8,029) | (130) | (8,159) |
| Veritas Capital Fund III & IV, LP – private equity | 2,319,698 | 37,430 | 2,357,128 |
| Viking Global Equities III, Ltd. – domestic equity | 2,500,270 | 40,344 | 2,540,614 |
| Visium Balanced Fund, LP – hedge funds | 2,112,715 | 34,093 | 2,146,808 |
| Total investment management and administrative fees | 72,741,363 | 1,173,742 | 73,915,105 |
| | | | |
| **Other investment fees** | | | |
| Investment consultant fees | | | |
| Summit Strategies, Inc. | 812,974 | 13,118 | 826,092 |
| TimberLink Consulting | 47,976 | 774 | 48,750 |
| Investment custodial fees | | | |
| BNY Mellon | 397,800 | 6,419 | 404,219 |
| Performance and risk measurement fees | | | |
| BNY Mellon | 178,557 | 2,881 | 181,438 |
| MSCI | 255,871 | 4,129 | 260,000 |
| Internal investment activity expenses | 3,366,920 | 54,328 | 3,421,248 |
| Total investing activity expenses | 77,801,461 | 1,255,391 | 79,056,852 |
| | | | |
| **Securities lending activity** | | | |
| Securities lending borrower rebates | (95,022) | (1,533) | (96,555) |
| Securities lending management fees | | | |
| BNY Mellon | 123,015 | 1,985 | 125,000 |
| Deutche Bank | 13,664 | 220 | 13,884 |
| Total securities lending activity expenses | 41,657 | 672 | 42,329 |
| Total investment expenses | $77,843,118 | $1,256,063 | $79,099,181 |

*ADDITIONAL FINANCIAL INFORMATION*

*Pension Trust Funds*

## **Schedules of Internal Investment Activity Expenses** | Year Ended June 30, 2016

| | MSEP | Judicial Plan | Total |
|---|---|---|---|
| **Personnel services** | | | |
| Salaries | $1,937,566 | $31,264 | $1,968,830 |
| Fringe benefits | 827,229 | 13,348 | 840,577 |
| Total personnel services | 2,764,795 | 44,612 | 2,809,407 |
| **Professional services** | | | |
| Attorney services | 67,029 | 1,082 | 68,111 |
| Total professional services | 67,029 | 1,082 | 68,111 |
| **Communications** | | | |
| Telephone | 16,314 | 263 | 16,577 |
| Total communications | 16,314 | 263 | 16,577 |
| **Facilities** | | | |
| Utilities | 2,592 | 42 | 2,634 |
| Lease expense | 45,710 | 738 | 46,448 |
| Depreciation | 35,850 | 578 | 36,428 |
| Facility maintenance | 7,599 | 123 | 7,722 |
| Vehicle maintenance and operation | 119 | 2 | 121 |
| Total facilities | 91,870 | 1,483 | 93,353 |
| **Software and equipment** | | | |
| Computer supplies and software | 5,726 | 92 | 5,818 |
| Depreciation | 9,630 | 155 | 9,785 |
| Loss on sale of equipment | 639 | 10 | 649 |
| Total software and equipment | 15,995 | 257 | 16,252 |
| **Education, meetings and travel** | | | |
| Professional development including travel | 29,433 | 475 | 29,908 |
| Due diligence travel | 70,949 | 1,145 | 72,094 |
| Total travel and meetings | 100,382 | 1,620 | 102,002 |
| **General** | | | |
| Research and information services | 268,846 | 4,338 | 273,184 |
| Membership dues | 16,335 | 264 | 16,599 |
| Office supplies | 1,568 | 25 | 1,593 |
| Periodicals and publications | 10,393 | 168 | 10,561 |
| Miscellaneous expense | 13,393 | 216 | 13,609 |
| Total general | 310,535 | 5,011 | 315,546 |
| Total internal investment activity expenses | $3,366,920 | $54,328 | $3,421,248 |

*Pension Trust Funds*

## **Schedules of Administrative Expenses** | Year Ended June 30, 2016

| | MSEP | Judicial Plan | Total |
|---|---|---|---|
| **Personnel services** | | | |
| Salaries | $4,132,399 | $ 66,680 | $4,199,079 |
| Fringe benefits | 1,721,978 | 27,786 | 1,749,764 |
| Total personnel services | 5,854,377 | 94,466 | 5,948,843 |
| **Professional services** | | | |
| Actuarial services | 303,720 | 4,901 | 308,621 |
| Attorney services | 189,991 | 3,066 | 193,057 |
| Auditing services | 75,630 | 1,220 | 76,850 |
| Banking services | 34,927 | 564 | 35,491 |
| Consulting services | 136,752 | 2,207 | 138,959 |
| Total professional services | 741,020 | 11,958 | 752,978 |
| **Communications** | | | |
| Video production | 1,285 | 21 | 1,306 |
| Telephone | 52,606 | 849 | 53,455 |
| Printing | 38,534 | 622 | 39,156 |
| Postage and mailing | 134,048 | 2,163 | 136,211 |
| Total communications | 226,473 | 3,655 | 230,128 |
| **Facilities** | | | |
| Depreciation | 109,939 | 1,774 | 111,713 |
| Utilities | 54,387 | 878 | 55,265 |
| Facility maintenance | 48,345 | 780 | 49,125 |
| Vehicle maintenance and operation | 5,550 | 90 | 5,640 |
| Total facilities | 218,221 | 3,522 | 221,743 |
| **Software and equipment** | | | |
| Computer supplies and software | 96,537 | 1,558 | 98,095 |
| Depreciation | 222,400 | 3,589 | 225,989 |
| Maintenance agreements | 314,122 | 5,069 | 319,191 |
| Equipment rental | 134,717 | 2,174 | 136,891 |
| Loss on sale of equipment | 8,634 | 139 | 8,773 |
| Total software and equipment | 776,410 | 12,529 | 788,939 |
| **Education, meetings and travel** | | | |
| Board travel and meetings | 33,118 | 534 | 33,652 |
| Professional development including travel | 79,227 | 1,278 | 80,505 |
| MOSERS sponsored seminars | 77,340 | 1,248 | 78,588 |
| Due diligence travel | 1,721 | 28 | 1,749 |
| Tuition reimbursement | 18,418 | 297 | 18,715 |
| Total education, meetings and travel | 209,824 | 3,385 | 213,209 |
| **General** | | | |
| Advertising | 27,320 | 438 | 27,758 |
| Research and information services | 99,900 | 1,612 | 101,512 |
| Insurance | 132,021 | 2,130 | 134,151 |
| Membership dues | 33,770 | 545 | 34,315 |
| Business continuity | 62,244 | 1,004 | 63,248 |
| Office supplies | 12,030 | 194 | 12,224 |
| Periodicals and publications | 95,755 | 1,545 | 97,300 |
| Miscellaneous | 10 | 0 | 10 |
| Total general | 463,050 | 7,468 | 470,518 |
| Total administrative expenses | $8,489,375 | $136,983 | $8,626,358 |

*ADDITIONAL FINANCIAL INFORMATION*

*Internal Service Funds*

## Schedules of Administrative Expenses | Year Ended June 30, 2016

| | Life and LTD | Deferred Compensation | Total |
|---|---|---|---|
| **Personnel services** | | | |
| Salaries | $290,285 | $270,585 | $ 560,870 |
| Employee fringe benefits | 119,875 | 102,677 | 222,552 |
| Total personnel services | 410,160 | 373,262 | 783,422 |
| **Professional services** | | | |
| Auditing services | 1,847 | 37,259 | 39,106 |
| Banking services | 651 | 0 | 651 |
| Total professional services | 2,498 | 37,259 | 39,757 |
| **Communications** | | | |
| Postage and mailing | 7,188 | 0 | 7,188 |
| Telephone | 3,409 | 1,228 | 4,637 |
| Printing | 2,698 | 80 | 2,778 |
| Video production expense | 81 | 1,385 | 1,466 |
| Total communications | 13,376 | 2,693 | 16,069 |
| **Facilities** | | | |
| Building use charge | 34,786 | 6,838 | 41,624 |
| Utilities | 3,877 | 0 | 3,877 |
| Maintenance | 3,316 | 0 | 3,316 |
| Total facilities | 41,979 | 6,838 | 48,817 |
| **Software and equipment** | | | |
| Computer supplies and equipment | 6,487 | 2,629 | 9,116 |
| Depreciation | 0 | 2,658 | 2,658 |
| Equipment maintenance | 21,463 | 537 | 22,000 |
| Equipment rental | 9,168 | 0 | 9,168 |
| Total software and equipment | 37,118 | 5,824 | 42,942 |
| **Education, meetings and travel** | | | |
| Board travel and meetings | 2,180 | 0 | 2,180 |
| Professional development including travel | 6,761 | 9,720 | 16,481 |
| MOSERS sponsored seminars | 4,835 | 0 | 4,835 |
| Due diligence travel | 120 | 3,840 | 3,960 |
| Total education, meetings and travel | 13,896 | 13,560 | 27,456 |
| **General** | | | |
| Advertising | 1,858 | 9,492 | 11,350 |
| Research and information services | 6,980 | 14,600 | 21,580 |
| Insurance | 9,243 | 0 | 9,243 |
| Membership dues | 2,360 | 925 | 3,285 |
| Business continuity | 6,062 | 0 | 6,062 |
| Office supplies | 4,495 | 282 | 4,777 |
| Periodicals and publications | 818 | 0 | 818 |
| Total general | 31,816 | 25,299 | 57,115 |
| Total administrative expenses | $550,843 | $464,735 | $1,015,578 |

## **Schedules of Professional Service Fees** | Year Ended June 30, 2016

| | | Pension Trust Funds | | | Internal Service Funds | | |
|---|---|---|---|---|---|---|---|
| Professional Services | Nature of Service | MSEP | Judicial Plan | Total | Life and LTD | Deferred Compensation | Total |
| **Operation administrative expenses** | | | | | | | |
| Avtex Solutions, Inc. | Information technology consulting | $ 39,776 | $ 642 | $ 40,418 | $ 0 | $ 0 | $ 0 |
| Central Bank | Banking | 34,570 | 558 | 35,128 | 453 | 0 | 453 |
| Charlesworth & Associates | Risk management consulting | 9,945 | 160 | 10,105 | 0 | 0 | 0 |
| Collector Solutions, Inc. | Banking | 357 | 6 | 363 | 198 | 0 | 198 |
| Cortex | Board asset advisor search | 31,246 | 504 | 31,750 | 0 | 0 | 0 |
| Cross Reporting Service, Inc. | Legal counsel | 313 | 5 | 318 | 0 | 0 | 0 |
| Dell | Information technology consulting | 13,910 | 224 | 14,134 | 0 | 0 | 0 |
| DocSTAR | Information technology consulting | 14,171 | 229 | 14,400 | 0 | 0 | 0 |
| Gabriel, Roeder, Smith & Co. | Actuarial | 303,720 | 4,901 | 308,621 | 0 | 0 | 0 |
| Gamble & Schlemeier, Ltd. | Governmental consulting | 24,603 | 397 | 25,000 | 0 | 0 | 0 |
| Huber & Associates | Information technology consulting | 757 | 12 | 769 | 0 | 0 | 0 |
| HyperGen, Inc. | Information technology consulting | 886 | 14 | 900 | 0 | 0 | 0 |
| Kramer & Frank, PC | Legal counsel | 124 | 2 | 126 | 0 | 0 | 0 |
| Midwest Litigation Services | Legal counsel | 63 | 1 | 64 | 0 | 0 | 0 |
| Monaco, Sanders, Rachine, Powell & Riedy | Legal counsel | 369 | 6 | 375 | 0 | 0 | 0 |
| Steptoe & Johnson | Legal counsel | 849 | 14 | 863 | 0 | 0 | 0 |
| Thompson Coburn, LLP | Legal counsel | 188,144 | 3,036 | 191,180 | 0 | 0 | 0 |
| United States District Court | Legal counsel | 129 | 2 | 131 | 0 | 0 | 0 |
| Williams Keepers, LLC | Financial audit | 75,630 | 1,220 | 76,850 | 1,847 | 37,259 | 39,106 |
| World Wide Technology | Information technology consulting | 1,458 | 25 | 1,483 | 0 | 0 | 0 |
| Operation administrative expenses subtotal | | 741,020 | 11,958 | 752,978 | 2,498 | 37,259 | 39,757 |
| **Internal investment administrative expenses** | | | | | | | |
| Kasowitz, Benson, Torres & Friedman, LLP | Legal counsel | 764 | 12 | 776 | 0 | 0 | 0 |
| Thompson Coburn LLP | Legal counsel | 66,265 | 1,070 | 67,335 | 0 | 0 | 0 |
| Internal investment administrative expenses subtotal | | 67,029 | 1,082 | 68,111 | 0 | 0 | 0 |
| **Total professional service fees** | | $808,049 | $13,040 | $821,089 | $2,498 | $37,259 | $39,757 |

Information on investment management and consulting fees can be found in the *Schedule of Investment Expenses* on pages 59-60.

*ADDITIONAL FINANCIAL INFORMATION*

*Pension Trust Funds*

## **Investment Summary** | Year Ended June 30, 2016

| | June 30, 2015 | | | | June 30, 2016 | | |
|---|---|---|---|---|---|---|---|
| Type of Investment | Cost Value | Fair Value | Purchases & Capital Additions at Cost | Sales & Redemptions at Cost | Cost Value | Fair Value | Percent of Total Fair Value |
| **Fixed income** | | | | | | | |
| Treasury bonds, notes, and bills | $ 4,164,585,678 | $ 4,109,906,639 | $ 346,074,426 | $ (590,112,427) | $3,920,547,677 | $ 3,958,718,113 | 42% |
| Gov't. bonds and gov't. mortgage-backed securities | 53,233,538 | 43,001,590 | 7,023,361 | (4,449,364) | 55,807,535 | 47,606,027 | 1 |
| Corporate bonds | 1,207,470 | 847,433 | 78,467 | (1,096,163) | 189,774 | 111,600 | 0 |
| Convertible bonds | 0 | 0 | 911,071 | 0 | 911,071 | 968,785 | 0 |
| International corporate bonds | 5,782,442 | 3,964,906 | 1,152,036 | (5,405,514) | 1,528,964 | 1,263,124 | 0 |
| Bank loans | 555,751 | 98 | 0 | (555,751) | 0 | 0 | 0 |
| Total fixed income | 4,225,364,879 | 4,157,720,666 | 355,239,361 | (601,619,219) | 3,978,985,021 | 4,008,667,649 | 43 |
| **Venture capital limited partnerships** | 3,198,991,680 | 4,827,465,957 | 442,041,533 | (636,647,950) | 3,004,385,263 | 4,267,419,604 | 46 |
| **Common stock** | 374,656,847 | 415,247,698 | 11,440,087 | (88,778,964) | 297,317,970 | 286,901,771 | 3 |
| **International investments** | | | | | | | |
| International equities | 178,019,681 | 858,319,652 | 1,108,155 | (3,798,909) | 175,328,927 | 789,143,593 | 8 |
| Foreign currency | 83,401 | (2,687) | 7,519,605 | (54) | 7,602,952 | 7,821,688 | 0 |
| Total international investments | 178,103,082 | 858,316,965 | 8,627,760 | (3,798,963) | 182,931,879 | 796,965,281 | 8 |
| **Real estate investment trust** | 3,617 | 10,056 | 0 | 0 | 3,617 | 10,646 | 0 |
| **Options futures** | 0 | 0 | 9,198,200 | (9,281,820) | (83,620) | (10,658,205) | 0 |
| **Investments** *(per Statements of Fiduciary Net Position page 24)* | 7,977,120,105 | 10,258,761,342 | 826,546,941 | (1,340,126,916) | 7,463,540,130 | 9,349,306,746 | 100% |
| **Short-term investments** | | | | | | | |
| Short-term investment funds | 2,237,306,891 | 2,237,306,892 | 1,168,825,843 | (951,659,938) | 2,454,472,796 | 2,454,472,796 | |
| Repurchase agreements | 12,153,028 | 12,153,028 | 2,296,621,949 | (2,299,106,761) | 9,668,216 | 9,668,216 | |
| **Total short-term investments** | 2,249,459,919 | 2,249,459,920 | 3,465,447,792 | (3,250,766,699) | 2,464,141,012 | 2,464,141,012 | |
| **Invested securities lending collateral** | | | | | | | |
| Corporate bonds | 839,357 | 149,065 | 0 | (120,592) | 718,765 | 37,210 | |
| Short-term investment funds | 19,078,986 | 19,078,986 | 342,852,240 | (347,709,849) | 14,221,377 | 14,221,377 | |
| **Total invested securities lending collateral** | 19,918,342 | 19,228,051 | 342,852,240 | (347,830,441) | 14,940,142 | 14,258,587 | |
| **Total investments** | $10,246,498,366 | $12,527,449,313 | $4,634,846,973 | $(4,938,724,056) | $9,942,621,284 | $11,827,706,345 | |

*Internal Service Funds*

## **Investment Summary** | Year Ended June 30, 2016

| | June 30, 2015 | | | | June 30, 2016 | | |
|---|---|---|---|---|---|---|---|
| Type of Investment | Cost Value | Fair Value | Purchases and Capital Additions at Cost | Sales and Redemptions at Cost | Cost Value | Fair Value | Percent of Total Fair Value |
| Repurchase agreements | $4,482,083 | $4,482,083 | $1,098,605,133 | $(1,099,152,174) | $3,935,042 | $3,935,042 | 100% |

Note: Due to space limitations and printing costs, a detailed listing of the investment holdings and transactions is not provided in this annual report; however, the detailed reports are available for review as an appendix to this report at the MOSERS office.

“I don’t remember the exact date, but I began participating in the deferred compensation program many years ago. I believe I started with a payroll deduction of $25 a month to match the state contribution at that time. As years passed, I have increased my monthly contribution, and in hindsight, actually wish that I would have increased my contribution a bit more than I did.

My advice to other state employees when it comes to retirement planning and security is to start young and start small if you need to. Make a plan to increase your contribution in intervals and increments that you won’t notice. Pay attention to what the retirement benefits are when you first become employed. Thirty years goes by in the blink of an eye.”

– *April*
*Higginsville Habilitation Center (DMH)*

*“My advice to other state employees when it comes to retirement planning and security is to start young and start small if you need to.”*

## Investment Section

## Chief Investment Officer's Report

**Missouri State Employees' Retirement System**
Mailing Address: PO Box 209, Jefferson City, MO 65102-0209
Phone: (573) 632-6100 • (800) 827-1063 | Fax: (573) 632-6103
MO Relay: 7-1-1 (Voice) • (800) 735-2966 (TTY)
Website: *www.mosers.org* | Email: *mosers@mosers.org*
*Visit us at 907 Wildwood Drive, Jefferson City, MO*

MOSERS
WE ARE HERE FOR YOUR BENEFIT.

October 14, 2016

Dear Members:

I am pleased to present the *Investment Section* of the MOSERS *Comprehensive Annual Financial Report* for the fiscal year ended June 30, 2016.

The MOSERS portfolio generated a time-weighted rate of return, based on fair value, of 0.3% for the year ended June 30, 2016, net of all fees and expenses. The result was below our 8% assumed rate of return and underperformed our policy benchmark by 7.1%. In no uncertain terms – this is a disappointing result.

Since this is my first annual letter, I would like thank Rick Dahl, Gary Findlay, and John Watson for giving me the chance to protect the retirement interests of over 114,000 current and former state employees and their families. However, ultimately it took the confidence of a board to allow me to serve in this role. So, I owe appreciation to Antwaun Smith, Lori Neidel, Laura Davis, Don Martin, Senators Joe Keaveny and Wayne Wallingford, Representatives Mike Leara and Caleb Jones, Treasurer Clint Zweifel and Commissioner Doug Nelson. Rest assured, I come to work every day with the mission of making the board reflect on their decision with pride, by delivering an investment return that allows for a dignified retirement for our state's public servants.

For the second year in a row, the performance of the portfolio has underperformed the 8% assumed rate of return. In addition, time frames that have traditionally been viewed as "long-term" are underperforming the assumed rate of return. Large asset portfolios, like MOSERS, get the return broadly available to the type of portfolio of assets owned. While the CIO can attempt to add value in the margin, return cannot be created where it doesn't exist. Ultimately, assumed asset returns have not materialized. This problem is not unique to MOSERS – much of the institutional asset management community has systematically overestimated the returns from investing for 20 years. We will continue to work at this challenge with the understanding that adding risk to the portfolio is not the answer. Retirement, regardless of the type of plan it comes in, is more expensive today than it was 20 years ago.

The low return environment will be challenging for all investors. While the investment staff can't create returns, we can manage costs by rationalizing active management and improve our diversification to most efficiently earn market returns. We will continue to work on the things we can manage.

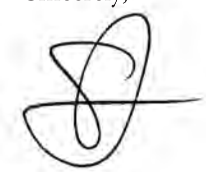
The causes of this year's underperformance are easily diagnosed and understood. However, performance deserves a critical review. This year's result notwithstanding, being different from the benchmark can be positive. The best success with active management comes when the effort is focused on risk management. To this end, traditionally, we have used active management to avoid over-priced risks in favor of risks with higher future returns – and have been successful. The best long-term returns come from those investors willing to take a contrary approach – buying unloved assets while selling adored assets. While this approach has an ability to make one look foolish in the short-term, in the long-term, it has resulted in higher returns and proves patience will financially accrue to the investor willing to focus on large margins of safety.

Our internal strategies, which are heavily biased toward undervalued assets, told us to buy the most cyclically sensitive sectors too early. Internal strategies, like emerging markets and higher actual inflation, caused a portion of this year's underperformance. Being contrary in the financial markets, unfortunately, means you are constantly at odds with the momentum crowd. This friction is created because the momentum crowd determines an asset is worth owning due to its appreciated price. That same crowd ignores the fact that, all else equal, a lower price makes the asset more attractive and represents lower risk in the future (since a majority of the risk was observed in the price decline).

External manager selection stands out as being particularly problematic this year. The last several years, we made changes to benchmarks without corresponding changes to the manager roster. Our external active management  was used to deemphasize U.S. corporate growth. The return environment for the assets that diversify US corporate growth has been difficult, which caused our external managers to underperform. We will continue to transform the active manager roster, but are patient enough to ensure the transformation is positive for the fund.

So what does this mean for the future? It means we will focus on the things we can control; namely, management fees, the portfolio's diversification and the portfolio's active management. While the return environment might remain difficult, staff will focus on putting the fund in the best position for success over the long term.

Sincerely,



Seth Kelly
Chief Investment Officer

## Investment Policy Summary

### Guiding Principles

Critical to the financial security of present and future benefit recipients is the effectiveness and efficiency of the system's asset management program. The MOSERS Board of Trustees, charged with the responsibility for investing the assets of the system in a manner consistent with fiduciary standards set forth in the prudent person rule, has adopted the following fundamental principles to guide all investment-related decisions:

- Preserve the long-term corpus of the fund.
- Maximize total return within prudent risk parameters.
- Act in the exclusive interest of the system's members.

The investment policy summary serves as a reference point for management of system assets and outlines MOSERS' investment philosophy and practices. Investments within this report are presented on the basis of fair value using a variety of sources such as appraisals, valuations of underlying companies and assets for limited partnerships and commingled funds, and through fair values obtained from the investment custodian.

### Investment Objective

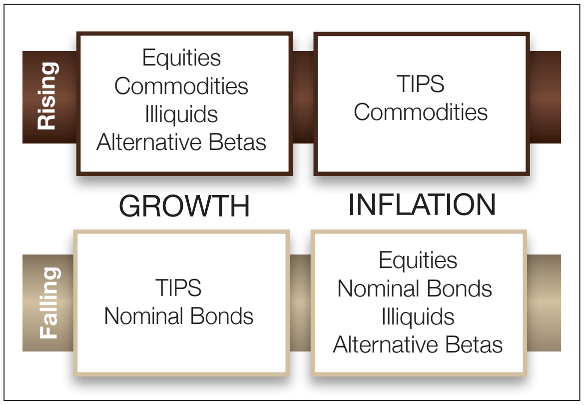
In keeping with the three guiding principles, the board has adopted the following broad investment objectives:

- Develop a real return objective (RRO) that will keep contribution rates reasonably level over long periods of time, absent changes in actuarial assumptions.
- Establish a risk-balanced allocation policy that is expected to meet the RRO over long periods of time, while minimizing the impact of the fund's volatility on the contribution rate.
- Maximize the return per unit of cost of the investment program through the efficient use of internal and external resources.

### Investment Beliefs

MOSERS' internal investment staff and external general asset consultant have arrived at investment beliefs, which are the foundation for implementation of the investment portfolio to achieve the board's objectives. These beliefs guide every decision made within MOSERS' portfolio. They are the fundamental concepts underlying the MOSERS investment program. These beliefs are:

**Economic Environments**




- **Portfolio construction should focus first on the allocation and balancing of risk; it is the allocation of risk that drives portfolio returns.** While investment returns receive a lot of public attention, understanding and balancing risk across asset classes improves the consistency of returns for a given level of risk and thus provides more stability in the contribution rate for the employer. Returns are the end product, where risks are the ingredients.
- **Diversification is critical because the future is unknown.** Reliable diversification requires a fundamental understanding of the economic drivers of risk and return. MOSERS' policy portfolio has been built upon the premise that very little is known about what the future holds. Therefore, it is rational to construct a portfolio that is believed to combat various economic conditions. The illustration above reflects various economic environments and the types of investments that should be expected to perform well in those environments.
- **Every investment should be examined in the context of its potential return from beta (market return) and alpha (value added return); while separation is not always possible, every effort should be made to distinguish the two distinct return components.** Beta is the return which is expected to be earned by investing passively within a specific asset class or compensated risk premium. Exposures to beta can be purchased cheaply, and over long periods of time, the beta return should be positive and coincide with the risk associated with a given asset class. In contrast, alpha is the return generated through a manager's ability to select particular investments that perform better than the asset class as a whole. Alpha is a zero-sum game.

- **Regardless of the source of the return, it is important to construct the portfolio based on a conscious decision to include a certain amount of beta exposure in the portfolio and a certain amount of alpha exposure.** By consciously selecting this balance within the portfolio, staff is better able to manage the risks of the portfolio while ensuring the RRO is achieved.
- **Flexibility to opportunistically alter the portfolio away from risk-balanced when markets are driven to extremes as a result of short-term economic cycles is an important portfolio management tool.** As a result of the cyclical nature of the economy, asset classes or investment strategies may be more or less attractive relative to others in given time frames, thus marginal flexibility in the allocation policy provides the system with the opportunity to capitalize on this within prudent risk constraints. Under circumstances where the valuations of a particular asset class are compelling, it may make sense to modify the portfolio's allocation at the margins in order to capitalize on attractively valued opportunities without exposing the fund to additional risk.

## Roles and Responsibilities

### Board of Trustees

The board of trustees bears the ultimate fiduciary responsibility for the investment of system assets. Members of the board must adhere to state law and prudent standards of diligence with respect to their duties as investment fiduciaries. Accordingly, they are required to discharge their duties in the interest of plan participants. They must also "act with the same care, skill, prudence, and diligence under prevailing circumstances that a prudent person, acting in a similar capacity and familiar with those matters, would use in the conduct of a similar enterprise with similar aims."[1] Specifically related to investments, the board is charged with the duties of establishing and maintaining broad policies and objectives for the investment program along with the recommendations of staff and the external asset consultants.

### Executive Director

The executive director is appointed by and serves at the pleasure of the board. The board has given the executive director broad authority for planning, organizing, and administering the operations and investments of the system under broad policy guidance from the board. Specifically with regard to investments, the executive director is broadly responsible for the oversight of the investment program. The executive director must ensure that system assets are invested in accordance with the board's policies and that internal controls are in place to safeguard system assets. The executive director must also certify that all manager hiring and termination decisions were made in accordance with the board's governance policy. In addition, the executive director certifies strategic allocation decisions were made in accordance with the governance policy.

### Chief Investment Officer and Internal Staff

The CIO serves at the pleasure of the executive director, yet has a direct line of communication with the board on investment-related issues. The CIO has primary responsibility for the overall direction of the investment program. The CIO works with the external asset consultants and the executive director in advising the board on policies related to the investment program. The CIO has primary responsibility to make hiring and termination decisions related to money managers with the approval of the external general asset consultant. The CIO is also responsible for making strategic allocation decisions with the approval of the external general asset consultant. Other responsibilities of the CIO include monitoring the investment of system assets, overseeing external money managers and the internally managed portfolios, and keeping the board apprised of situations which merit their attention. The internal investment staff is accountable to the CIO.

### External Asset Consultants

Summit Strategies Group of St. Louis, Missouri serves as the system's external general asset consultant at the pleasure of the board. The primary duties of the external general asset consultant are to:

- Advise the board on policies related to the investment program.
- Provide a third-party perspective and level of oversight to the system's investment program.

The external general asset consultant must approve all manager hiring and termination decisions and strategic allocation decisions made by the CIO. The external general asset consultant provides advice and input to the CIO and internal investment staff on investment-related issues and money manager searches.

Blackstone Alternative Asset Management serves as the system's external hedge fund consultant at the pleasure of the board. The primary duties of the external hedge fund consultant are to:

- Advise the board on policies related to the hedge fund program.
- Provide a third-party perspective and level of oversight to the system's hedge fund investment program.

[1] Section 105.688, RSMo - Investment Fiduciaries, Duties.

The external hedge fund consultant must approve all hedge fund manager hiring and termination decisions. The external hedge fund consultant provides advice and input to the CIO and internal investment staff on hedge fund program issues and manager searches.

**Chief Auditor**
The chief auditor reports directly to the executive director and if, in the opinion of the chief auditor circumstances warrant, may report directly to the board. The chief auditor is independent of the system's investment operations and, among other duties, is responsible for providing objective audit and review services for the investment operations. It is the chief auditor's objective to promote adequate and effective internal controls at a reasonable cost.

**Master Custodian**
Bank of New York Mellon serves as the master custodian of the system's assets except in cases where investments are held in partnerships, commingled accounts, or unique asset classes where it is impossible for them to do so. The master custodian is responsible for maintaining the official book of records, providing performance reports, and serving as an additional layer of risk control in the safekeeping of system assets.

## Asset Allocation

Determining the system's asset allocation is regarded as one of the most important decisions in the investment management process. The board, with advice from staff and the external general asset consultant, has developed a risk-weighted policy allocation that is designed to achieve the long-term required return objectives of the system, given certain risk constraints. The current allocation reflects the need for a diversified portfolio, which will perform well in a variety of economic conditions and will help reduce the portfolio's overall volatility. In determining the optimum mix of assets, the board considers five factors:

- The expected risk of each asset class.
- The expected rate of return for each asset class.
- The correlation between the rates of return of the asset classes.
- The investment objectives and risk constraints of the fund.
- The impact of the portfolio's volatility on the contribution rate.

While the board maintains a set policy allocation mix, they have taken steps to provide flexibility by granting authority to the CIO, with the approval of the external general asset consultants and certification of the executive director, to make strategic allocation decisions to capitalize on attractively valued opportunities within prudent risk constraints. This flexibility has allowed the system to take advantage of changing market conditions. The table below illustrates the policy asset allocation and ranges formally adopted by the board as of June 30, 2012.

## Asset Allocation

| Beta-Balanced Portfolio (80% of total capital) | Risk Allocation Policy | Risk Allocation Ranges[1] | Benchmark Index (weight)[2] | Illiquids Portfolio[6] (20% of total capital) | Benchmark Index (weight) |
|---|---|---|---|---|---|
| Global equity | 20% | 13% - 27% | MSCI ACWI[3] — (19%) | Total Illiquids | S&P 500 + 3% (20%)[7] |
| Nominal bonds | 20% | 13% - 27% | Barclays Long Treasury — (37%) | | |
| Inflation-indexed bonds | 20% | 13% - 27% | Barclays 1-10 TIPS — (64%) | | |
| Commodities | 20% | 13% - 27% | S&P GSCI[4] — (17%) | | |
| Alternative betas | 20% | 13% - 27% | AQR DELTA[5] — (31%) | | |

1 The board has granted the CIO the authority to alter the equal risk-weighted allocation policy. This authority exists within risk ranges as depicted in the table above. These risk ranges, like the policy allocation, are driven by the long-term volatility and correlation expectations for the five betas that make up the beta-balanced portfolio. The CIO will make these strategic allocation decisions away from the policy benchmark subject to consultation and agreement from the chief general asset consultant (CGAC).

2 Benchmarks are net of MOSERS' actual leveraging costs on borrowed assets with the exception of the alternative beta benchmark which is net of management fees.

3 Morgan Stanley Capital International All Country World Index (net dividends).

4 S&P Goldman Sachs Commodity Index (formerly Goldman Sachs Commodity Index).

5 A diversified risk-balanced portfolio of liquid hedge fund risk premia managed by AQR Capital net of management fees.

6 Illiquids portfolio upper limit of 27.5% of capital, no new commitments past 23%.

7 Legacy real estate and timber assets are benchmarked to the Dow Jones U.S. Select REIT Index and NCREIF Timber respectively.

### Rebalancing

It is the responsibility of staff to ensure that the asset allocation adheres to the system's rebalancing policy. MOSERS utilizes a combination of cash market and exchange traded futures transactions to maintain the total fund's allocation at the broad policy level. Month end reviews are conducted to bring the portfolio back within allowable ranges of the broad policy targets.

### Risk Controls

MOSERS' investment program faces numerous risks; however, the primary risk to MOSERS is that the assets will not support the liabilities over long periods of time. In order to control this risk and numerous other risks that face the system, the board has taken the following steps, on an ongoing basis, to help protect the system:

- Actuarial valuations are performed each year to ensure the system is on track to meet the funding objectives of the plan. In addition, every five years an external audit of the actuary is conducted to ensure that the assumptions being made and calculation methods being utilized are resulting in properly computed liabilities.
- Asset/liability studies are conducted at least once every five years. The purpose of these studies is to ensure that the current portfolio design is structured to meet the system's liabilities. During these studies, investment expectations are also reexamined in more detail.
- A governance policy, which incorporates investment limitations, is in place to ensure that board policies are clearly identified. Within these documents, desired outcomes are identified, responsibilities for individuals are identified in relation to particular areas of the portfolio's management, and details are provided for measuring outcomes. Reporting requirements are clearly identified to ensure appropriate checks and balances are in place. In addition, annual performance audits are conducted to ensure the performance measurement tools and methodologies being utilized are proper.

### Performance Objectives and Monitoring Process

Generating returns net of expenses equaling the RRO (5.5% in FY16) plus inflation remains the primary performance objective for the total fund.

The reason for the long-term focus on this objective is to preclude the temptation to overreact to events in the marketplace that have no relevance in the management of the relationship between the system's assets and liabilities. The resulting dilemma is the conflicting need to evaluate investment policy implementation decisions over shorter time frames while maintaining the longer-term focus necessary to manage and measure the fund's performance relative to the RRO. To address this problem, the board evaluates performance relative to policy and strategy benchmarks. This helps to evaluate the board's broad policy decisions and the staff and external consultant's implementation decisions. Policy benchmarks measure broad investment opportunities of each sub-asset class in which MOSERS has chosen to invest. The strategy benchmarks represent decisions made by the CIO to strategically deviate from the policy asset allocation for each sub-asset class. The return of the strategy benchmarks are determined based upon the actual weight of the asset class multiplied by the appropriate benchmark.

The policy and strategy benchmarks are used in the following manner to evaluate board and staff decisions:

- **Board Decisions:** The value added through board policy decisions is measured by the difference between the total fund policy benchmark return and the RRO. This difference captures the value added by the board through their policy asset allocation decisions relative to the return necessary to fund the system's liabilities. A policy benchmark return greater than the RRO reflects value added through board decisions. A policy benchmark return less than the RRO reflects losses or shortfalls in performance in funding the liabilities. These policy decisions are measured over long periods of time.
- **CIO and External Consultants' Decisions:** There are two components to decisions made by the CIO and external consultants, which are monitored by the board on an ongoing basis. They are: 1) strategic allocation decisions, and 2) implementation decisions.

Strategy decisions are made by the CIO, with the approval of the external general asset consultant and the review of the executive director, to deviate from the policy benchmark weight. The difference between the strategy benchmark return and the policy benchmark return captures the value added by the CIO through strategic decisions to overweight or underweight asset allocations relative to the board's policy allocation decisions. A strategy benchmark return greater than the policy benchmark return reflects value added through the sub-asset class allocation decisions. A strategy benchmark return less than the policy benchmark return reflects losses to the fund's performance based upon strategy decisions. Strategy decisions should be measured over all periods of time with majority weight placed on outcomes that have occurred over a market cycle.

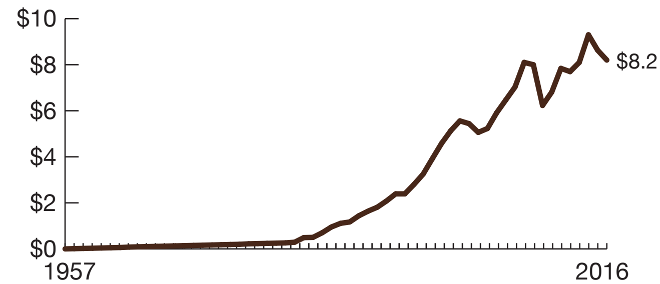
Implementation decisions are money manager selection choices made by the CIO with the approval of the appropriate external consultant and the certification of the executive director that the decision was made in accordance with the board's adopted governance policy. The value added through these decisions is measured by the difference between the actual portfolio return and the strategy benchmark return. This difference captures the value added through these external manager selection decisions. An actual portfolio return greater than the strategy benchmark return reflects value added through these external manager selection decisions. An actual portfolio return less than the strategy benchmark return reflects losses to the fund's performance based upon implementation decisions. Implementation decisions should be measured over all periods of time with a majority weight placed on outcomes that have occurred over a market cycle.

The board reviews performance information on a quarterly basis to help ensure adequate monitoring of the fund's overall performance objectives.

## Total Fund Review

As of June 30, 2016, the MOSERS investment portfolio had a fair value of $8.2 billion. The graph to the right illustrates the growth of MOSERS' portfolio since the system's inception.

**Total Fund Growth** (Billions)




### Investment Performance

MOSERS' investments generated a time-weighted return of 0.3%, net of fees, for FY16. The total fund return trailed the 1-year policy benchmark by 7.1%, but over the last 20-year period has outperformed the policy benchmark by 0.8% on an annualized basis.

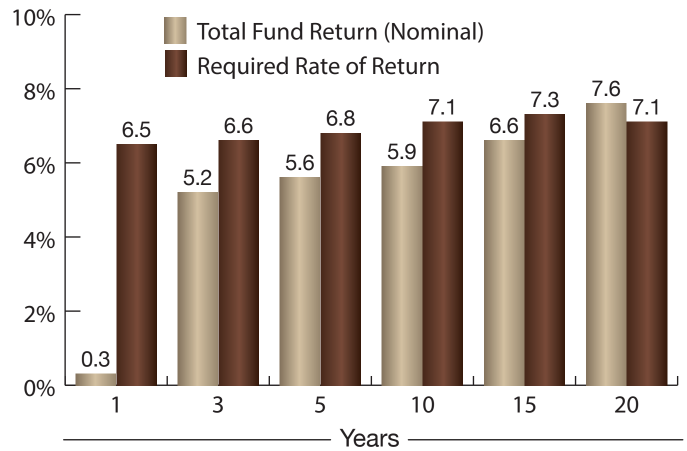
### Investment Performance vs. Required Rate of Return

The total fund investment return is compared to a required rate of return. The required rate of return is established by the board to determine how well the fund is performing over the long term in order to meet future plan obligations after accounting for inflation. The required rate of return for FY16 is equal to the RRO of 5.5% plus inflation. The best known measure of inflation is the Consumer Price Index (CPI).[2]

Given the randomness of the investment markets, the portfolio should not be expected to meet the required rate of return every year. A review of long periods of time is best to evaluate whether or not the total return has kept pace with the system's funding objectives.

As indicated in the center bar chart, MOSERS' investment returns exceeded the required rate of return by 0.5% over the 20-year period ended June 30, 2016.[3]

**Total Fund Actual Return vs. Required Rate of Return**

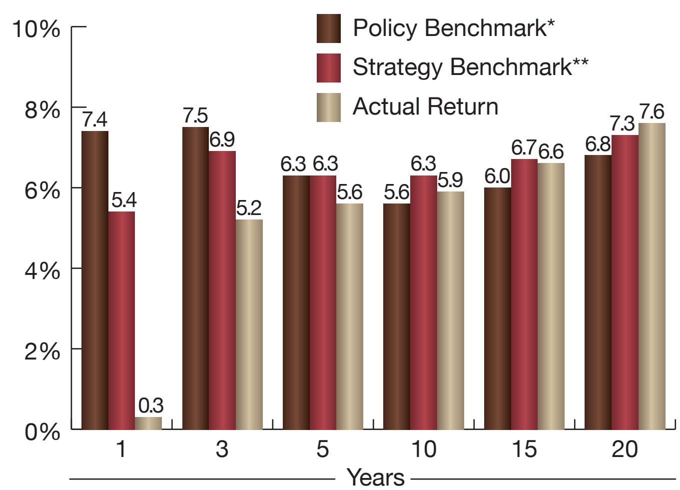



### Investment Performance vs. Benchmark Comparisons

In addition to measuring performance relative to the required rate of return, the board also compares fund returns to the policy benchmark and the strategy benchmark. Returns for the total fund versus these benchmarks are displayed in the bar chart to the right.

The policy benchmark provides an indication of the returns that could have been achieved (excluding transaction costs) by a portfolio invested passively in the broad market with percentage weights allocated to each asset class in MOSERS' policy asset allocation.

**Total Fund Actual Return vs. Benchmark Return**




* As of June 30, 2016, the policy benchmark was comprised of the following components: 80% total beta-balanced policy benchmark and 20% total illiquids portfolio policy benchmark.

** As of June 30, 2016, the strategy benchmark was comprised of the following components: 81.2% total beta-balanced strategy benchmark and 18.8% total illiquids portfolio policy benchmark.

[2] CPI Source: United States Department of Labor, Bureau of Labor Statistics (not seasonally adjusted).

[3] Performance returns are calculated using a time-weighted rate of return on fair values.

Comparison of the total return to the policy benchmark is a reflection of the extent to which the asset allocation kept pace with the system's funding objectives. The total fund 1-, 3-, and 5-year actual performance underperformed its policy benchmark by 7.1%, 2.3%, and 0.7% with the actual 10-, 15-, and 20-year returns exceeding the policy benchmarks by 0.3%, 0.6%, and 0.8%, respectively.

The strategy benchmark is more narrowly defined and focuses on sub-asset class allocation decisions made by the CIO. By comparing the policy benchmark to the strategy benchmark, the board is able to determine the value added through strategic decisions (active management) made by the CIO. Value is created when the strategy benchmark returns exceed the policy benchmark returns.

### Total Fund Actual Return vs. Benchmark Returns

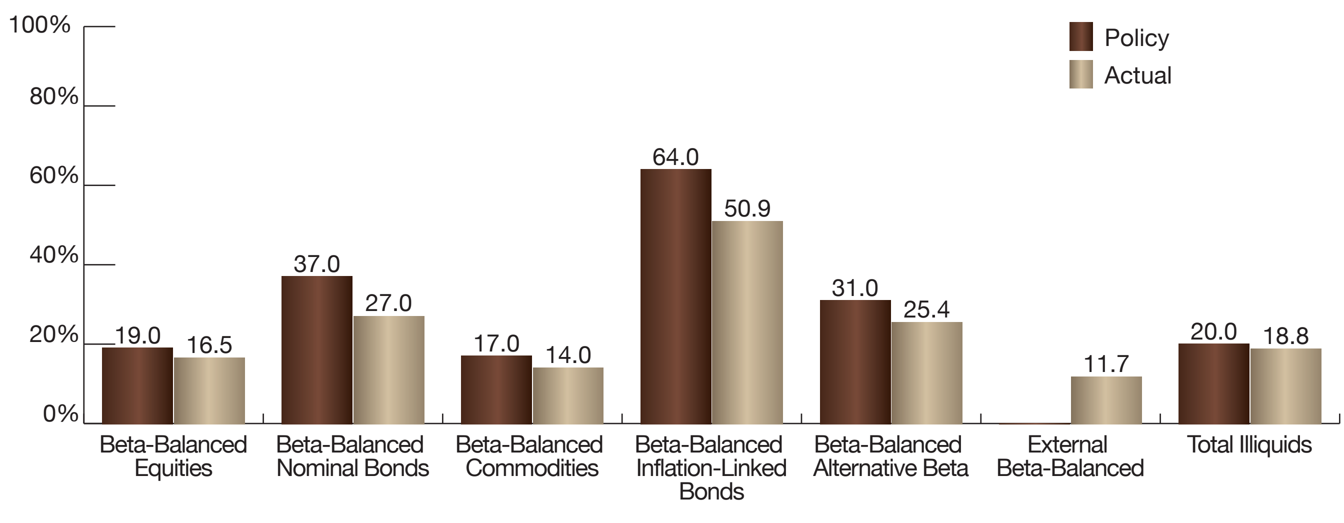
Similarly, by comparing the actual return to the strategy benchmark, the board will, over the long term, be able to judge the success or failure of the staff and the consultant in implementing the CIO's strategic decisions. The primary implementation decision is in determining which managers the fund should employ. Value is added from manager selection when the total fund return exceeds the strategy benchmark return.

### Total Fund Policy Allocation Overview

As of June 30, 2016, the board's broad policy allocation mix was 80% beta-balanced and 20% illiquids. The policy target, as of June 30, 2016, for each sub-asset class, along with the actual strategic allocation to each type of investment, is shown in the bar graph below.

The board has granted authority to the CIO to make strategic decisions. A strategic decision should be thought of as any decision that might cause MOSERS' actual portfolio to differ from the policy asset allocation. This has allowed MOSERS to capitalize on investment opportunities at the margin by overweighting asset classes that are viewed as "cheap" relative to their historical norm and underweighting asset classes that are "expensive" relative to their historical norm.

**Total Fund Allocation** | Policy vs. Actual (As a Percentage of the Total Fund)



The asset allocation is built upon the belief that diversification is critical. The tables below reflect the asset classes and their correlation to each other and the statistical performance data, net of fees, of the total fund as of June 30, 2016.

## Total Fund - Correlation Table - 5 Years

| | Beta-Balanced Equities | Beta-Balanced Nominal Bonds | Beta-Balanced Commodities | Beta-Balanced Inflation-Indexed Bonds | Beta-Balanced Alternative Beta | Illiquids |
|---|---|---|---|---|---|---|
| Beta-balanced equities | 1.00 | | | | | |
| Beta-balanced nominal bonds | (0.53) | 1.00 | | | | |
| Beta-balanced commodities | 0.59 | (0.42) | 1.00 | | | |
| Beta-balanced inflation-indexed bonds | 0.23 | 0.46 | 0.23 | 1.00 | | |
| Beta-balanced alternative beta | 0.39 | (0.07) | (0.06) | 0.21 | 1.00 | |
| Illiquids | 0.43 | (0.28) | 0.22 | (0.02) | 0.34 | 1.00 |

## Total Fund - Statistical Performance

| Portfolio Characteristics | 1 Year | 3 Year | 5 Year | 10 Year | 15 Year | 20 Year |
|---|---|---|---|---|---|---|
| Annualized return | 0.3% | 5.2% | 5.6% | 5.9% | 6.6% | 7.6% |
| Annualized standard deviation | 7.6% | 6.9% | 7.4% | 8.8% | 8.9% | 9.4% |
| Sharpe ratio | 0.02 | 0.74 | 0.75 | 0.56 | 0.59 | 0.56 |
| Excess return* | (7.1)% | (2.3)% | (0.7)% | 0.3% | 0.6% | 0.8% |
| Beta* | 0.95 | 0.92 | 0.83 | 0.74 | 0.80 | 0.84 |
| Annualized alpha* | (6.5)% | (1.6)% | 0.3% | 1.6% | 1.7% | 1.7% |
| Correlation* | 0.92 | 0.94 | 0.95 | 0.95 | 0.95 | 0.96 |
| Value added in dollars** | $(603M) | $(568M) | $(252M) | $491M | $1.1B | $1.5B |

* *As compared to the total fund policy benchmark.*
** *MOSERS earnings above what would have been earned if assets had been invested passively.*

## **Schedule of Investment Portfolios by Asset Class** | As of June 30, 2016

| | Fair Value | Percentage of Investments at Fair Value | Market Exposure | Percentage of Investments at Market Exposure |
|---|---|---|---|---|
| **Internal beta-balanced** | | | | |
| Beta-balanced equities | $1,156,949,774 | 14.1% | $ 1,358,911,157 | 16.5% |
| Beta-balanced nominal bonds | 669,269,342 | 8.1 | 2,222,780,778 | 27.0 |
| Beta-balanced commodities | 364,077,818 | 4.4 | 1,155,946,291 | 14.0 |
| Beta-balanced inflation-indexed bonds | 1,329,465,125 | 16.2 | 4,189,752,830 | 50.9 |
| Beta-balanced alternative betas | 2,188,780,688 | 26.7 | 2,093,608,307 | 25.4 |
| Total internal beta-balanced | 5,708,542,747 | 69.5 | 11,020,999,363 | 133.8 |
| External beta-balanced | 963,611,551 | 11.7 | 963,611,551 | 11.7 |
| Illiquids | 1,549,202,065 | 18.8 | 1,549,202,065 | 18.8 |
| Residual accounts from old portfolio | 2,980,696 | 0.0 | 2,980,696 | 0.0 |
| Cash reserve | 3,538,652 | 0.0 | 0 | 0.0 |
| **Grand total** | $8,227,875,711 | 100.0% | $13,536,793,675 | 164.3% |

| | |
|---|---|
| Reconciliation to *Statements of Fiduciary Net Position* | |
| Total portfolio value | $8,227,875,711 |
| Reverse repurchase agreements | 3,601,461,597 |
| Short-term investment fund (STIF) | (2,454,472,797) |
| Uninvested cash | 40,581 |
| Interest and dividends receivable | (53,130,415) |
| Variation margin | 16,251,526 |
| Accounts receivable securities sold | (37,033,265) |
| Accounts payable securities purchased | 36,690,153 |
| Fees payable | 10,942,073 |
| Securities lending liability | 681,582 |
| Investments per *Statements of Fiduciary Net Position* | $9,349,306,746 |

## Investment Advisors

| Investment Advisors Name | Style | Portfolio Fair Value |
|---|---|---|
| Actis | Illiquid — emerging markets | $ 41,204,066 |
| Alinda Capital Partners | Illiquid — infrastucture | 27,244,000 |
| American Industrial Partners | Illiquid — corporate buyout | 37,441,562 |
| AQR Capital Management | Beta-balanced — multi-strategy | 390,077,788 |
| AQR Capital Management | Beta-balanced — risk parity | 404,066,465 |
| Axiom Asia Private Capital Associates | Illiquid — emerging markets | 75,894,301 |
| Axxon Group | Illiquid — emerging markets | 16,347,160 |
| Bayview Asset Management | Illiquid — opportunistic mortgages | 58,918,656 |
| Blackstone Alternative Asset Management | Beta-balanced — fund-of-funds | 348,119,832 |
| Blackstone Real Estate Partners | Illiquid — active real estate | 190,586,379 |
| Blakeney Management | Beta-balanced — emerging markets | 51,220,393 |
| Bridgepoint Capital Partners | Illiquid — corporate buyout | 41,079,666 |
| Bridgewater Associates | Beta-balanced — global macro | 85,456,582 |
| Bridgewater Associates | Beta-balanced — risk parity | 483,712,947 |
| Campbell Group | Illiquid — timberland | 988,067 |
| CarVal Investors | Illiquid — distressed real estate debt | 20,400,000 |
| Castlelake | Illiquid — special situations | 17,171,363 |
| Catalyst Capital Group | Illiquid — Canadian distressed debt | 99,509,169 |
| Catterton Partners | Illiquid — corporate buyout | 66,219,051 |
| Cornwall Capital | Beta-balanced — multi-strategy | 70,233,163 |
| Davidson Kempner Capital Management | Beta-balanced — event driven | 26,355,338 |
| Development Partners International | Illiquid — emerging markets | 33,338,843 |
| DRI Capital | Illiquid — intellectual property | 16,692,841 |
| EIG Energy Partners | Illiquid — energy (mezzanine) | 50,207,693 |
| Elliott Management Corporation | Beta-balanced — multi-strategy | 142,229,000 |
| Eton Park Capital Management | Beta-balanced — multi-strategy | 866,874 |
| Farallon Capital Partners | Beta-balanced — multi-strategy | 3,370,000 |
| Gaoling Fund | Beta-balanced — long/short equity | 97,979,140 |
| Gateway Energy Partners | Illiquid Energy — diversified | 28,860,890 |
| Glenview Capital Management | Beta-balanced — long/short equity | 23,397,247 |
| Glenview Capital Management Sidecar | Beta-balanced — equity | 46,939,367 |
| Global Forest Partners | Illiquid — timberland | 194,505,557 |
| Harvest Fund Advisors | Illiquid — active MLP | 115,728,434 |
| HBK Capital Management | Beta-balanced — merger arbitrage | 52,905,567 |
| JLL Partners | Illiquid — corporate buyout | 71,853,068 |
| King Street Capital Management | Beta-balanced — credit driven | 5,032,883 |
| Linden Capital Partners | Illiquid — corporate buyout | 44,387,942 |
| Mast Capital Management | Beta-balanced — credit driven | 49,671,221 |
| Merit Energy Company | Illiquid — energy (oil & gas) | 8,083,711 |
| MHR Fund Management | Illiquid — distressed debt | 56,609,596 |
| Millennium Technology Value Partners | Illiquid — direct secondaries | 18,228,547 |
| New Mountain Capital | Illiquid — corporate buyout | 39,957,258 |
| NISA Investment Advisors | Beta-balanced | 289,535,435 |
| Oaktree Capital Management | Illiquid — opportunistic European loans | 693,254 |
| Oaktree Capital Management | Illiquid — real estate | 1,508,999 |
| Oaktree Capital Management | Illiquid — corporate buyout | 12,061,652 |
| Oaktree Capital Management | Illiquid — distressed debt | 27,963,156 |
| PAAMCO | Beta-balanced — fund-of-funds | 1,209,487 |
| Pharo Management | Beta-balanced — global macro | 107,174,309 |

*Investment Advisors continued on page 79*

*Investment Advisors continued from page 78*

| Investment Advisors Name | Style | Portfolio Fair Value |
|---|---|---|
| Resource Management Service — Wildwood Timberlands | Illiquid — timberland | 73,982,899 |
| Silchester International Investors | Beta-balanced — international equity | 786,326,162 |
| Silver Creek Capital Management | Illiquid — fund-of-funds (special situations) | 27,682,847 |
| Silver Lake Management Company | Illiquid — corporate buyout | 6,086,464 |
| SIR Capital Management | Beta-balanced — equity market neutral | 93,088,991 |
| Siris Capital Group | Illiquid — corporate buyout | 31,068,792 |
| State Street Global Advisors | Beta-balanced — emerging markets | 177,607,652 |
| StepStone Group | Illiquid — fund-of-funds (corporate buyout) | 26,022,153 |
| Stone Harbor Investment Partners | Beta-balanced — emerging market debt | 49,822,089 |
| TPG-Axon Capital | Residual — long/short credit | 1,218,105 |
| Veritas Capital | Illiquid — corporate buyout | 69,105,512 |
| Viking Global Investors | Beta-balanced — long/short equity | 155,547,959 |
| Visium Asset Management | Beta-balanced — long/short equity | 92,131,486 |
| Wellington Hedge Management Company | Beta-balanced — long/short equity | 538,042 |
| Miscellaneous (each less than $1M) | | 3,322,058 |
| | | $5,686,789,130 |

## Total Fund - Top Ten Publicly Traded Separate Account Holdings

| Ten Largest Holdings as of June 30, 2016* | Fair Value | Percent of the Total Fund |
|---|---|---|
| U.S. Treasury Inflation Index Note — 2.000%, 2025 | $243,278,326 | 2.93% |
| U.S. Treasury Inflation Index Note — 0.375%, 2023 | 230,097,424 | 2.78 |
| U.S. Treasury Inflation Index Note — 0.125%, 2023 | 223,243,759 | 2.69 |
| U.S. Treasury Inflation Index Note — 0.125%, 2019 | 209,193,723 | 2.52 |
| U.S. Treasury Inflation Index Note — 0.125%, 2018 | 208,621,253 | 2.52 |
| U.S. Treasury Inflation Index Note — 0.625%, 2021 | 200,207,791 | 2.42 |
| U.S. Treasury Inflation Index Note — 0.625%, 2024 | 193,557,125 | 2.33 |
| U.S. Treasury Inflation Index Note — 0.125%, 2022 | 180,097,606 | 2.17 |
| U.S. Treasury Inflation Index Note — 0.125%, 2022 | 177,672,339 | 2.14 |
| U.S. Treasury Inflation Index Note — 0.375%, 2025 | 174,013,120 | 2.10 |

** For a complete list of holdings, contact MOSERS.*

## Schedule of Investment Results* | 1-, 3-, 5-, 10-, 15- and 20-Year Periods

**Total fund** - As of June 30, 2016, the policy benchmark was comprised of the following components: 80% total beta-balanced policy benchmark and 20% total illiquids portfolio policy benchmark. The individual asset class benchmarks, as listed below, are used to generate the total fund policy benchmark.

- ***Beta-balanced*** - As of June 30, 2016, the total beta-balanced policy benchmark was comprised of the following components: 24% MSCI ACWI Net, 46% Barclays Long Treasuries, 21% Goldman Sachs Commodity, 80% Barclays U.S. TIPS 1-10 YR, and 39% AQR Delta. This program did not begin until September 2012.
- ***Illiquids*** - As of June 30, 2016, the illiquids benchmark was comprised of the following components: 62.1% S&P 500 +3%, 18.2% Dow Jones U.S. Select REIT, and 19.7% NCREIF Timber. This program did not begin until September 2012.

| | 1 Year | 3 Year | 5 Year | 10 Year | 15 Year | 20 Year |
|---|---|---|---|---|---|---|
| **Total fund** * | | | | | | |
| **MOSERS** | 0.3% | 5.2% | 5.6% | 5.9% | 6.6% | 7.6% |
| **Composite total return benchmark** | 7.4% | 7.5% | 6.3% | 5.6% | 6.0% | 6.8% |
| *Beta-balanced*** | | | | | | |
| MOSERS | 0.6% | 4.1% | N/A | N/A | N/A | N/A |
| Beta-balanced composite benchmark | 6.8% | 5.4% | N/A | N/A | N/A | N/A |
| *Illiquids*** | | | | | | |
| MOSERS | (1.5)% | 7.3% | N/A | N/A | N/A | N/A |
| Illiquids benchmark | 9.3% | 13.5% | N/A | N/A | N/A | N/A |

* *Time weighted rates of return on fair values adjusted for cash flows.*
** *Beta-balanced inception date was September 1, 2012*

## **Investment Manager Fees** | For the Year Ended June 30, 2016

| | Total Fees | Manager Fees | Fund Pass Through Expenses (1) | Incentive Fees Earned & Paid in FY16 | Portfolio Company Charges (2) |
|---|---|---|---|---|---|
| **Beta-balanced portfolio** | | | | | |
| Aeolus Property Catastrophe Spire Fund, LP | $ 21,398 | $ 4,948 | $ 0 | $ 16,450 | $ 0 |
| AQR Absolute Return Institutional Fund, LP | 3,298,207 | 166,350 | 61,697 | 3,070,160 | 0 |
| AQR DELTA Sapphire Fund, LP | 4,346,063 | 3,888,412 | 457,651 | 0 | 0 |
| AQR Global Risk Premium Fund IV, LP | 2,429,356 | 1,993,900 | 435,456 | 0 | 0 |
| AQR Style Premia Fund, LP | 1,122,353 | 0 | 60,845 | 1,061,508 | 0 |
| Blackstone Topaz Fund, LP | 4,679,429 | 3,333,797 | 494,253 | 851,379 | 0 |
| Blakeney Onyx, LP | 1,611,599 | 1,035,530 | 576,069 | 0 | 0 |
| Brevan Howard, LP | 1,513,331 | 1,052,940 | 460,391 | 0 | 0 |
| Bridgewater Associates — All Weather @12%, LLC | 2,053,363 | 1,766,341 | 287,022 | 0 | 0 |
| Bridgewater Associates — Diamond Ridge Fund, LLC | 3,551,520 | 3,454,902 | 96,618 | 0 | 0 |
| Cornwall Domestic, LP | 3,097,320 | 1,327,897 | 506,613 | 1,262,810 | 0 |
| Davidson Kempner Institutional Partners, LP | 983,061 | 445,387 | 92,325 | 445,349 | 0 |
| Elliott International, Ltd. | 3,726,997 | 1,772,232 | 1,089,112 | 865,653 | 0 |
| Empyrean Capital Fund, LP | (66,532) | 80,223 | 0 | (146,755) | 0 |
| Farallon Capital Institutional Partners, LP | (156,376) | 0 | 0 | (156,376) | 0 |
| Gaoling Fund, LP | 235,915 | 82,500 | 17,340 | 136,075 | 0 |
| Glenview Capital Opportunity Fund, LP | (1,749,485) | 159,168 | 140,951 | (2,049,604) | 0 |
| Glenview Sidecar | 10,423 | 0 | 10,423 | 0 | 0 |
| Harvest Fund Advisors, LLC | 923,096 | 923,096 | 0 | 0 | 0 |
| HBK Merger Strategies Offshore Fund, Ltd. | 1,493,051 | 252,365 | 75,200 | 1,165,486 | 0 |
| HBK Offshore Fund, Ltd. | 192,536 | 465,957 | 160,360 | (433,781) | 0 |
| King Street Capital, LP | 339,285 | 129,895 | 0 | 209,390 | 0 |
| King Street Capital, Ltd. | 7,482 | 7,326 | 0 | 156 | 0 |
| Mast Credit Opportunities I, LP | 431,705 | 879,350 | 196,927 | (644,572) | 0 |
| NISA Investment Advisors | 4,686,733 | 4,686,733 | 0 | 0 | 0 |
| Perry Partners, LP | 524 | 524 | 0 | 0 | 0 |
| Pharo Macro Fund, Ltd. | 3,127,879 | 2,198,352 | 130,297 | 799,230 | 0 |
| Silchester International Investors | 4,177,416 | 4,177,416 | 0 | 0 | 0 |
| SSGA Emerging Markets | 192,584 | 192,584 | 0 | 0 | 0 |
| Standard Investment Research Hedged Equity Fund | 3,732,195 | 2,341,385 | 182,276 | 1,208,534 | 0 |
| Stone Harbor Investment Partners | 279,587 | 279,587 | 0 | 0 | 0 |
| Viking Global Equities III, Ltd. | 2,540,614 | 2,385,186 | 155,428 | 0 | 0 |
| Visium Balanced Fund, LP | 2,146,808 | 2,119,863 | 378,515 | (351,570) | 0 |
| **Total beta-balanced managers** | 54,979,437 | 41,604,146 | 6,065,769 | 7,309,522 | 0 |
| | | | | | |
| **Illiquids portfolio** | | | | | |
| Actis Emerging Markets III | 626,000 | 593,000 | 33,000 | 0 | 0 |
| Actis Emerging Markets IV | 844,000 | 720,000 | 124,000 | 0 | 0 |
| African Development Partners I, LLC | (614,768) | 354,085 | 179,855 | (1,148,708) | 0 |
| African Development Partners II, LLC | 792,373 | 742,217 | 50,156 | 0 | 0 |
| Alinda Infrastructure Fund I, LP | 426,327 | 406,172 | 20,155 | 0 | 0 |
| American Industrial Partners Capital Fund V, LP | 1,063,226 | 691,420 | 66,768 | 305,038 | 0 |
| American Industrial Partners Capital Fund VI, LP | 597,380 | 503,429 | 93,951 | 0 | 0 |
| Axiom Asia Private Capital Fund II, LP | 621,426 | 351,000 | 35,124 | 235,302 | 0 |
| Axiom Asia Private Capital Fund III, LP | 956,831 | 500,000 | 52,350 | 404,481 | 0 |
| Axxon Brazil Private Equity Fund II B, LP | 1,001,065 | 608,184 | 392,881 | 0 | 0 |
| Bayview Opportunity Domestic LP | 435,698 | 132,763 | 95,487 | 207,448 | 0 |
| Bayview Opportunity Domestic III b, LP | 1,798,471 | 1,056,835 | 332,271 | 409,365 | 0 |
| Blackstone Real Estate Partners IV | (729,418) | 0 | 56,170 | (785,588) | 0 |
| Blackstone Real Estate Partners V | 558,454 | 0 | 70,444 | 488,010 | 0 |
| Blackstone Real Estate Partners VI | (1,369,512) | 386,181 | 29,204 | (1,784,897) | 0 |
| Blackstone Real Estate Partners VII | 2,836,879 | 786,009 | 67,523 | 1,983,347 | 0 |
| Bridgepoint Europe III A, LP | 92,954 | 67,013 | 25,941 | 0 | 0 |
| Bridgepoint Europe IV B, LP | 290,469 | 260,783 | 29,686 | 0 | 0 |
| Campbell Timber Fund II A, LP | 487,720 | 473,042 | 14,678 | 0 | 0 |

*Investment Manager Fees continued on page 83*

*Investment Manager Fees continued from page 82*

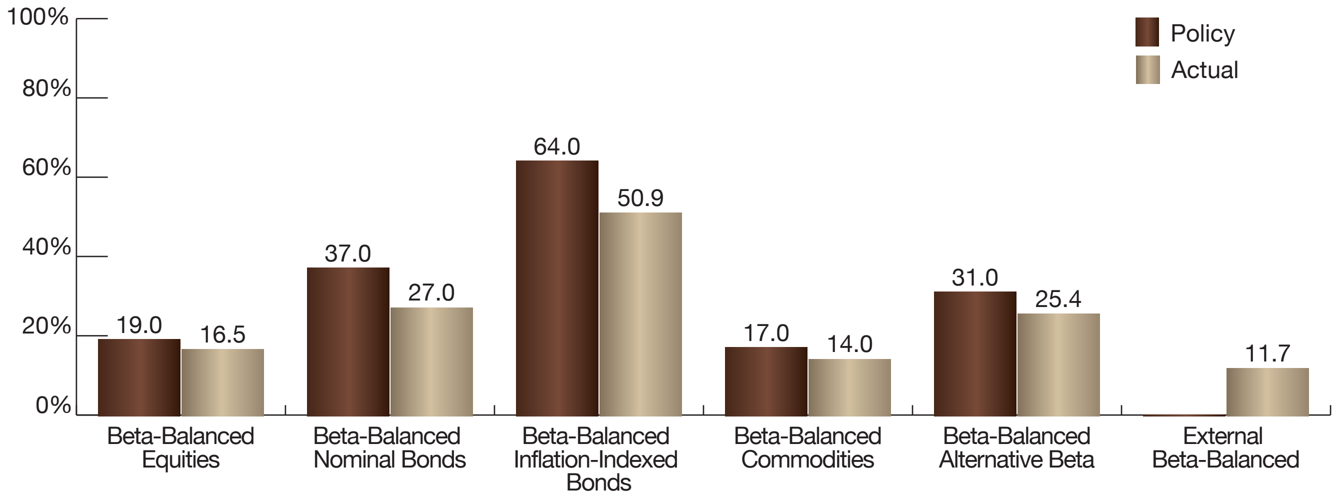
| | Total Fees | Manager Fees | Fund Pass Through Expenses (1) | Incentive Fees Earned & Paid in FY16 | Portfolio Company Charges (2) |
|---|---|---|---|---|---|
| CarVal Investors CVI | | | | | |
| Global Value Fund A, LP — private debt | 55,403 | 157,991 | 47,997 | (150,585) | 0 |
| CarVal Investors CVI | | | | | |
| Global Value Fund A, LP — real estate | 55,403 | 157,991 | 47,997 | (150,585) | 0 |
| Castlelake Aviation II, LP | 1,524,248 | 591,062 | 209,811 | 723,375 | 0 |
| Catalyst Fund Limited Partnership III, LP | (311,423) | 906,356 | 90,401 | (1,308,180) | 0 |
| Catalyst Fund Limited Partnership IV, LP | 783,255 | 453,178 | 90,767 | 239,310 | 0 |
| Catalyst Fund Limited Partnership V, LP | 2,573,537 | 2,307,087 | 266,450 | 0 | 0 |
| Catterton Partners V, LP | 145,197 | 114,545 | 17,041 | 0 | 13,611 |
| Catterton Partners VI, LP | 382,813 | 306,114 | 25,472 | 30,368 | 20,859 |
| Catterton Partners VII, LP | 1,474,212 | 600,000 | 22,327 | 851,885 | 0 |
| DRI Capital - LSRC | 399,403 | 169,600 | 147,462 | 82,341 | 0 |
| EIG Energy Fund Co-investment | 8,635 | 0 | 8,635 | 0 | 0 |
| EIG Energy Fund XIV, LP | 395,839 | 324,082 | 71,334 | 0 | 423 |
| EIG Energy Fund XV, LP | (1,602,817) | 521,630 | 65,508 | (2,195,315) | 5,360 |
| EIG Energy Fund XVI, LP | 542,177 | 499,973 | 42,199 | 0 | 5 |
| Garnet Sky Investors Company, Ltd. | (1,286,597) | 636,754 | 112,412 | (2,035,763) | 0 |
| Gateway Energy & Resource Holdings, LLC | 292,705 | 23,646 | 375,803 | (106,744) | 0 |
| Global Forest Partners GTI7 | | | | | |
| Institutional Investors Company, Ltd. | 754,727 | 618,411 | 136,316 | 0 | 0 |
| JLL Partners Fund V, LP | (62,153) | 165,594 | 8,696 | (236,443) | 0 |
| JLL Partners Fund VI, LP | 1,337,921 | 505,807 | 29,378 | 802,736 | 0 |
| Linden Capital Partners II, LP | 675,660 | 656,737 | 18,923 | 0 | 0 |
| Merit Energy Partners F-II, LP | 251,019 | 146,104 | 104,915 | 0 | 0 |
| MHR Institutional Partners II A, LP | (2,926,824) | 0 | 55,651 | (2,982,475) | 0 |
| MHR Institutional Partners III, LP | (7,454,232) | 397,700 | 86,983 | (7,938,915) | 0 |
| MHR Institutional Partners IV, LP | 943,236 | 875,000 | 68,236 | 0 | 0 |
| Millennium Technology Value Partners II, LP | 230,213 | 500,000 | 35,825 | (305,612) | 0 |
| New Mountain Partners III, LP | 3,900,536 | 320,869 | 15,002 | 3,535,965 | 28,700 |
| OCM/GFI Power Opportunities Fund II, LP | 32,765 | 8,834 | 4,828 | 19,103 | 0 |
| OCM Opportunities Fund IV b, LP | 21,199 | 0 | 7,692 | 13,507 | 0 |
| OCM Opportunities Fund VII b, LP | (788,307) | 215,734 | 49,657 | (1,053,698) | 0 |
| OCM Opportunities Fund VIII b, LP | 49,919 | 324,738 | 101,850 | (376,669) | 0 |
| OCM Power Opportunities Fund III, LP | 1,444,106 | 350,308 | 32,967 | 1,060,831 | 0 |
| OCM Real Estate Opportunities Fund III, LP | (364,000) | 0 | 63,966 | (427,966) | 0 |
| Resource Management Service — | | | | | |
| Wildwood Timberlands, LLC | 400,661 | 365,556 | 35,105 | 0 | 0 |
| StepStone Capital Buyout Fund I, LP | 3,844 | 36,998 | 62,897 | (96,051) | 0 |
| StepStone Capital Buyout Fund II, LP | 104,727 | 74,899 | 29,828 | 0 | 0 |
| StepStone Opportunities Fund II, LP | 81,685 | 17,512 | 82,487 | (18,314) | 0 |
| Silver Lake Partners II, LP | 505,259 | 70,924 | 4,517 | 429,818 | 0 |
| Siris Partners II, LP | 615,936 | 184,627 | 50,066 | 242,757 | 138,486 |
| Siris Partners III, LP | 679,704 | 610,352 | 62,012 | 0 | 7,340 |
| The Veritas Capital Fund III, LP | 59,225 | 100,991 | 17,828 | (119,806) | 60,212 |
| The Veritas Capital Fund IV, LP | 2,297,903 | 417,133 | 16,864 | 1,693,855 | 170,051 |
| **Total illiquid portfolio managers** | 18,942,294 | 23,366,970 | 4,593,749 | (9,463,472) | 445,047 |
| | | | | | |
| **Residual portfolio** | | | | | |
| BlackRock Financial Management Bank Loans | 1,533 | 1,533 | 0 | 0 | 0 |
| TPG-Axon Partners (Offshore), Ltd. | (8,159) | 0 | 0 | (8,159) | 0 |
| **Total residual portfolio managers** | (6,626) | 1,533 | 0 | (8,159) | 0 |
| | | | | | |
| **Grand totals** | $73,915,105 | $64,972,649 | $10,659,518 | $(2,162,109) | $445,047 |

*(1) Fund Pass Through Expenses are administrative expenses charged to the fund and paid by the limited partners (including MOSERS), in addition to the management fee. These expenses may include, but are not limited to, accounting, audit, legal, and custody expenses directly related to the administration of the underlying fund investments.*

*(2) Portfolio Company Charges are fees/costs paid to the general partners of private equity funds which are not applied as offsets to gross management fees. These charges are paid by the underlying portfolio companies of the funds, and therefore, are indirectly paid by MOSERS.*

## Beta-Balanced Asset Class Summary

**Beta-Balanced Allocation** | Policy vs. Actual (As a Percentage of the Total Fund)




For the year ended June 30, 2016, the beta-balanced allocation returned 0.6%. The slightly positive return was driven primarily by the strong positive performance of nominal bonds offset by the poor performance of commodities.

### Highlights

- External active management decisions this year, primarily the external managers in the alternative beta and external risk parity allocation, caused the return to be 3.5% below our policy benchmark.
- Strategic decisions led to an additional 2.7% underperformance versus our policy benchmark. Overweights to emerging markets, foreign developed markets, and energy were the primary drivers of the strategic underperformance.

### Portfolio Structure

The goal of the beta-balanced portfolio is to equalize the portfolio's risk exposure across economic environments through risk-balanced allocations to assets. The assets currently being used in the beta-balanced portfolio are global equities, U.S. nominal bonds, inflation-indexed bonds, commodities and alternative betas.

There is both an internal and external component of the beta-balanced portfolio. Bridgewater All-Weather and AQR Global Risk Premium are utilized for the external portion of the risk balanced portfolio, while the internal portion is managed by staff utilizing NISA Investment Advisors to implement the trading and operational aspects of the program.

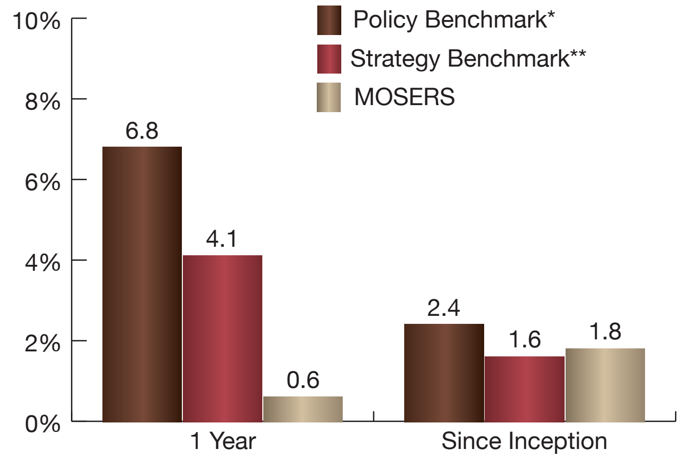
### Market Overview

In general, slow growth and continued global economic uncertainty led to tempered returns for risk assets during the year. Volatility was one of the bigger stories of the year with most markets down sharply during the first seven months of the fiscal year and then rebounding significantly over the next five months. For instance, global equities were down 11% during the first seven months of the year, but recovered to finish the year down 3.5%. Emerging market equities experienced an even more dramatic ride being down 23% and recovering to finish down 12%. Commodities were down 36% after January and finished the year down 26%. Even more dramatic, oil was down 54% and finished the year down “only” 15%. Similar to last year, assets were weaker abroad than they were at home with U.S. equities up 3% for the year while developed international equities were down 10% and emerging markets were down 12%. For the second consecutive year, the bright spot was long U.S. treasury bonds which were up almost 19% as people continued to react to the weakness in the global economies.

### Performance

For FY16, the beta-balanced portfolio returned 0.6% versus 6.8% for the policy benchmark. The portfolio mirrored the volatility of the markets, down 11% at the end of January, but recovered to finish slightly positive at 0.6%. On an absolute basis, the portfolio suffered due to poor performance in commodities (down 29%) and global equities (down 7%). Those losses were partially offset by the strong performance of nominal bonds (up 18%). The primary driver of the underperformance was alternative beta performance versus its policy (+1.1% vs +6.6%, respectively). Global equities also underperformed by 3.2% (-6.7% vs -3.5%). Finally, the external risk parity managers returned (0.9%), significantly underperforming the policy of 6.8%. The bar chart to the right illustrates actual performance as compared to the policy and strategy benchmarks since inception. A description of each asset class follows:

**Beta-Balanced Return vs. Benchmark Returns**




* As of June 30, 2016, the total beta-balanced policy benchmark was comprised of the following components: 24% MSCI ACWI Net, 46% Barclays Long Treasuries, 21% S&P GSCI, 80% Barclays U.S. TIPS 1-10 YR, and 39% AQR Delta. All policy return components are adjusted for financing cost associated with the beta- balanced program. This program did not begin until September 2012.

** As of June 30, 2016, the total beta-balanced strategy benchmark was comprised of the following components: 24.3% MSCI ACWI Net, 40.5% Barclays Long Treasuries, 20.5% S&P GSCI, 75.1% Barclays U.S. TIPS 1-10 YR, and 38.2% AQR Delta. All strategy return components are adjusted for financing cost associated with the beta-balanced program. This program did not begin until September 2012.

- **Global equities:** The notional value of the equity portfolio on June 30, 2016, was $1,358,911,157, representing 16.5% of total notional exposure. For the fiscal year, the equity allocation returned (6.7%) versus (3.5%) for the global equity policy benchmark. The underperformance was driven by the overweight to emerging and international developed markets.
- **Long treasuries (nominal bonds):** As of June 30, 2016, the notional value of the long treasury portfolio was $2,222,780,778, representing 27.0% of total notional exposure. For the fiscal year, the long treasury allocation returned 17.9% versus 18.9% for the long treasury policy benchmark. Preferring to own TIPS in lieu of nominal treasuries and the tracking error associated with our futures implementation were the cause of the slight underperformance this year.
- **TIPS (inflation-indexed bonds):** As of June 30, 2016, the notional value of the TIPS portfolio was $4,189,752,830, representing 50.9% of total notional exposure. For the fiscal year, the TIPS allocation returned 2.9% versus 3.2% for the TIPS policy benchmark. There was no internal or external active management strategy during the year; thus providing a return that closely matched the benchmark.
- **Alternative beta:** As of June 30, 2016, the notional value of the alternative beta portfolio was $2,093,608,307, representing 25.4% of total notional exposure. The alternative beta allocation returned 1.1% for the fiscal year versus 6.6% for alternative beta policy benchmark. The under-performance was attributable to active hedge fund managers who collectively represented approximately 65% of the allocation and returned (1.2%) for the year.
- **External beta-balanced:** This allocation is composed of AQR Global Risk Premium and Bridgewater All-Weather. As a portfolio, they returned (0.9%) for the fiscal year and represented 11.7%, or $963,611,551 of market exposure. Similar to the internal portfolio, their performance was the result of below average results from most asset classes and a particularly large loss in commodities. As a portfolio, these two managers underperformed their benchmark for the year by 7.7%.

### Additional Portfolio Information

The table below shows the brokerage activity and statistical performance that occurred within the beta-balanced portfolio in FY16.

#### Beta-Balanced - Brokerage Activity

| | Shares Traded | Volume of Trades | Commissions Paid |
|---|---|---|---|
| Barclays Capital | 4,265 | $ 76,699 | $ 128 |
| BMO Capital Markets | 14,789 | 428,836 | 74 |
| BNY Convergex | 181,552 | 5,451,859 | 1,864 |
| BTIG, LLC | 38,413 | 1,143,739 | 1,152 |
| Cantor Fitzgerald & Co., Inc. | 1,186 | 45,367 | 36 |
| Citigroup Global Markets, Inc. | 100,275 | 3,987,932 | 3,008 |
| Converge, LLC | 72,703 | 3,025,648 | 727 |
| FBR Capital Markets & Co. | 127,825 | 3,574,632 | 3,835 |
| Jefferies & Co., Inc. | 1,048,455 | 26,074,841 | 5,242 |
| Jonestrading Institutional Services, LLC | 5,051 | 97,960 | 152 |
| Liquidnet, Inc. | 50,347 | 2,026,174 | 1,007 |
| Merlin Securities, LLC | 349,164 | 11,905,756 | 3,262 |
| Merrill Lynch Pierce Fenner Smith, Inc. | 10,631 | 308,314 | 319 |
| Morgan Stanley & Co., Inc. | 40,466 | 6,278,120 | 3,117 |
| Pickering Energy Partners | 21,716 | 731,075 | 651 |
| Raymond James & Associates, Inc. | 30,021 | 619,343 | 901 |
| RBC Capital Markets, LLC | 229,700 | 7,021,452 | 1,148 |
| UBS Securities, LLC | 13,117 | 384,808 | 315 |
| USCA Securities, LLC | 137,954 | 2,462,241 | 4,139 |
| Weeden & Co. | 323,432 | 7,138,055 | 4,422 |
| Wells Fargo Securities, LLC | 1,684,895 | 43,949,229 | 11,139 |
| | 4,485,957 | $126,732,080 | $46,638 |

#### Beta-Balanced - Statistical Performance

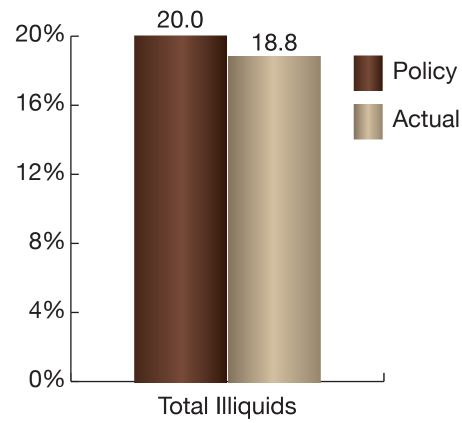
| Portfolio Characteristics | 1 Year | Since Inception (September 2012) |
|---|---|---|
| Return | 0.6% | 1.8% |
| Annualized standard deviation | 9.4% | 8.8% |
| Sharpe ratio | 0.05 | 0.20 |
| Excess return* | (6.2)% | (0.6)% |
| Beta* | 1.17 | 1.04 |
| Annualized alpha* | (7.1)% | (0.7)% |
| Correlation* | 0.94 | 0.95 |

** As compared to the beta-balanced policy benchmark.*

## Illiquids Asset Class Summary

For the year ended June 30, 2016, the illiquid investments portfolio returned (1.5%). Over this period, the positive returns from private equity and timber, 5.4% and 6.8%, respectively, were offset by negative returns from the private debt and real estate (including energy) segments of the portfolio, which returned (9.6%) and (14.2%), respectively.

**Illiquids Allocation**
(As a Percentage of the Total Fund)




### Highlights

- The illiquid investments portfolio holds a broad set of assets that are diversified by asset class, asset type, and geography. Over long periods of time the portfolio is expected to achieve attractive returns while contributing to the diversification of the total portfolio.
- At the end of the fiscal year, illiquid investments made up 18.8% of the total portfolio, which was below its target allocation of 20.0%.

### Portfolio Structure

The illiquid investments portfolio holds a variety of assets that were acquired over a number of years. A portion of these assets are expected to benefit during periods of economic growth, while others are expected to perform relatively well during periods of rising inflation. Like the beta-balanced portfolio, the illiquid investments portfolio distributes its risk among a broad group of assets that perform differently across various economic environments.

The illiquid portfolio's current structure includes private equity, private debt, real estate, timber, energy and infrastructure assets. Looking a bit deeper, these asset categories include investments in domestic buyout, European buyout, emerging market private equity, U.S. private debt, Canadian private debt, U.S. and non-U.S. real estate, and global exposures to timber, energy, and infrastructure.

### Market Overview

The following paragraphs briefly describe the markets where the illiquid investments portfolio has substantial exposure.

Private investments had another positive year, though performance varied widely depending on the strategy and geography. For the year ended June 30, 2016, fundraising for private investments remained strong, although the amount of capital raised was below the amount raised in the same period in 2015. The number of initial public offerings in the U.S., as well as the amount of proceeds raised, declined substantially in the twelve months ended June 2016, compared to 2015. For the one-year ended March 31, 2016, the Institutional Limited Partners Association (ILPA) Private Markets Benchmark-All Funds Index achieved a net-of-fee pooled IRR (internal rate of return) of 5.2%. This index, which measures the return of a broad group of private investments, is calculated by ILPA, in partnership with Cambridge Associates, and lags public benchmarks due to reporting delays that are inherent to the asset class. Among the numerous private market segments, European private equity and venture capital significantly outperformed, measured in U.S. dollars, the All Funds Index. Conversely, the natural resource segment substantially underperformed the All Funds Index, due primarily to the volatility experienced in the energy sector.

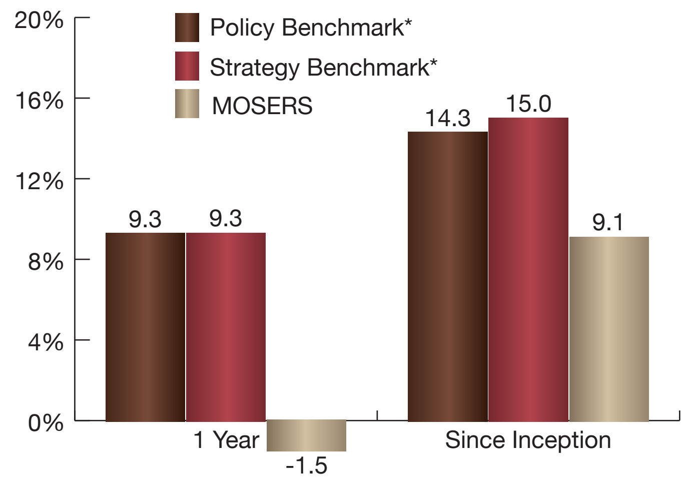
The institutional real estate market encompasses a number of property types, including office, apartment, retail, industrial, and hotel. A convenient method of gaining exposure to this asset class is to invest in publicly traded Real Estate Investment Trusts (REITs). The REIT market, as represented by the Dow Jones U.S. Select REIT Index, returned 22.9% for the year ended June 30, 2016, which is substantially above its long-term average. Investors can also participate in the real estate market outside of the public markets by investing in properties directly or through a private fund that owns underlying properties. The National Council of Real Estate Investment Fiduciaries (NCREIF) tracks domestic investment grade income producing properties that are owned by tax-exempt institutional investors. For the latest fiscal year, the NCREIF Property Index (NPI), a benchmark that measures the performance of private real estate, returned 10.6%.

Timber is an asset class that possesses some characteristics that differentiate it from other assets in the portfolio. For instance, timber can provide investors with periodic cash distributions over extended time periods. In some cases, these distributions can be managed by actively adjusting the harvest schedules depending on market conditions. That is, more timber can be cut and sold when prices are attractive, or harvests can be delayed to avoid weak pricing. When harvests are delayed, the trees continue to grow and add volume making them more valuable. This predictable and steady growth is a characteristic that many other assets don't possess. To measure the performance of private timberlands in the U.S., the NCREIF Timberland Index is commonly used. For the year ended June 30, 2016, the index returned 3.4%.

### Performance

Assessing the performance of a portfolio of illiquid investments has always been a challenge. The current policy benchmark is a composite of several indexes, the proportion of each varies month to month to mirror the exposures in the portfolio. In order for a benchmark to be considered appropriate, a number of criteria should be met. These criteria include: the assets in the benchmark must be identifiable in advance, the index must be investable, the index should be calculated frequently, and it should be consistent with the manager's investment style. While a great deal of thought and effort has gone into the selection of the benchmarks, a number of these criteria are not fully met, particularly where private investments are involved.

**Illiquids Return vs. Benchmark Returns**




* As of June 30, 2016, the illiquids policy and strategy benchmarks were comprised of the following components: 62.1% S&P 500 +3%, 18.2% DJ U.S. Select REIT Index, and 19.7% NCREIF Timber.

The illiquid investments portfolio, as of June 30, 2016, had a fair value of $1,549,202,065, and represented 18.8% of the fund's total investments. For the fiscal year, the illiquid investments portfolio returned (1.5%), net of fees. Over this same period, the illiquid investments policy benchmark, a blend of asset class policy indexes, returned 9.3%. The current structure of the total portfolio was adopted in September 2012, which for this narrative, is the inception date. Over that period, the illiquid investments portfolio has returned an annualized 9.1%, net of fees. Over this same period of three years and 10 months, the illiquid investments policy benchmark has achieved an annualized return of 14.3%. The returns for the latest year and since inception are illustrated in the bar chart above.

As previously mentioned, the benchmark of the illiquid investments portfolio is a blend of three indexes: S&P 500 Index plus 3%, the Dow Jones U.S. Select REIT Index and the NCREIF Timberland Index. Below are some additional details on each of these portfolio segments:

- The system's investments in private equity (domestic and European buyout, emerging market private equity and infrastructure) and private debt make up the part of the illiquid portfolio that is benchmarked against the S&P 500 Index plus 3%. For the fiscal year, the private equity and private debt portfolio returned 5.4% and (9.6%), respectively. This performance is mixed when compared to the benchmark return of 7.0%. Since inception, the private equity and private debt portfolio returned an annualized 11.7% and 7.2%, respectively, compared to the benchmark return of 16.4%.
- MOSERS' investments in private real estate and energy comprise the part of the illiquid portfolio that is benchmarked against the Dow Jones U.S. Select REIT Index. For the fiscal year, these assets returned (14.2%), compared to the benchmark return of 22.9%. The system's private energy investments were the primary driver of the negative return over this period. Since inception, this portion of the portfolio returned an annualized 6.0%, compared to the benchmark return of 12.1%.
- The system's timber holdings are benchmarked against the NCREIF Timberland Index. For the fiscal year, these assets returned 6.8%, compared to the benchmark return of 3.4%. Since inception, this portion of the portfolio has returned an annualized 9.4%, compared to the benchmark return of 8.5%.

While it is interesting to monitor shorter-term performance, illiquid investments should be evaluated over a long time frame. By looking at performance over multi-year periods, the short term volatility is removed and managers of illiquid assets are allowed sufficient time to build and possibly exit their investments. Over the latest ten years ending June 30, 2016, the illiquid investments portfolio returned 7.7%, which is 1.5% under the policy index return of 9.2%.

### Additional Portfolio Information

The table below shows the statistical performance of the illiquid investments portfolio in FY16.

#### Illiquids - Statistical Performance

| Portfolio Characteristics | 1 Year | Since Inception (September 2012) |
|---|---|---|
| Return | (1.5)% | 9.1% |
| Annualized standard deviation | 3.0% | 3.7% |
| Sharpe ratio | (0.54) | 2.43 |
| Excess return* | (10.8)% | (5.2)% |
| Beta* | 0.07 | 0.17 |
| Annualized alpha* | (2.1)% | 6.4% |
| Correlation* | 0.26 | 0.41 |

* *As compared to the beta-balanced policy benchmark.*

## Securities Lending Program

During the fiscal year ending June 30, 2016, MOSERS' net loss through its securities lending program was $49. MOSERS lends its domestic equity, international equity and fixed income securities through Deutsche Bank which manages the program in an agent capacity. In an agent lending program, the agent lender is responsible for making the loans to various broker-dealers, investing the cash collateral associated with the loaned securities, marking the loans and collateral to market on a daily basis, and, in most cases, indemnifying the lender against the default of a broker-dealer to whom they have loaned securities on behalf of the beneficial owner.

In FY16, income from domestic equity decreased due to a decrease in the average lendable balance, average on loan and lending margin. There was no income from international equity or fixed income as there were no securities to lend during the period. The tables as titled below show the last ten years of activity for the securities lending program.

### Domestic Equity

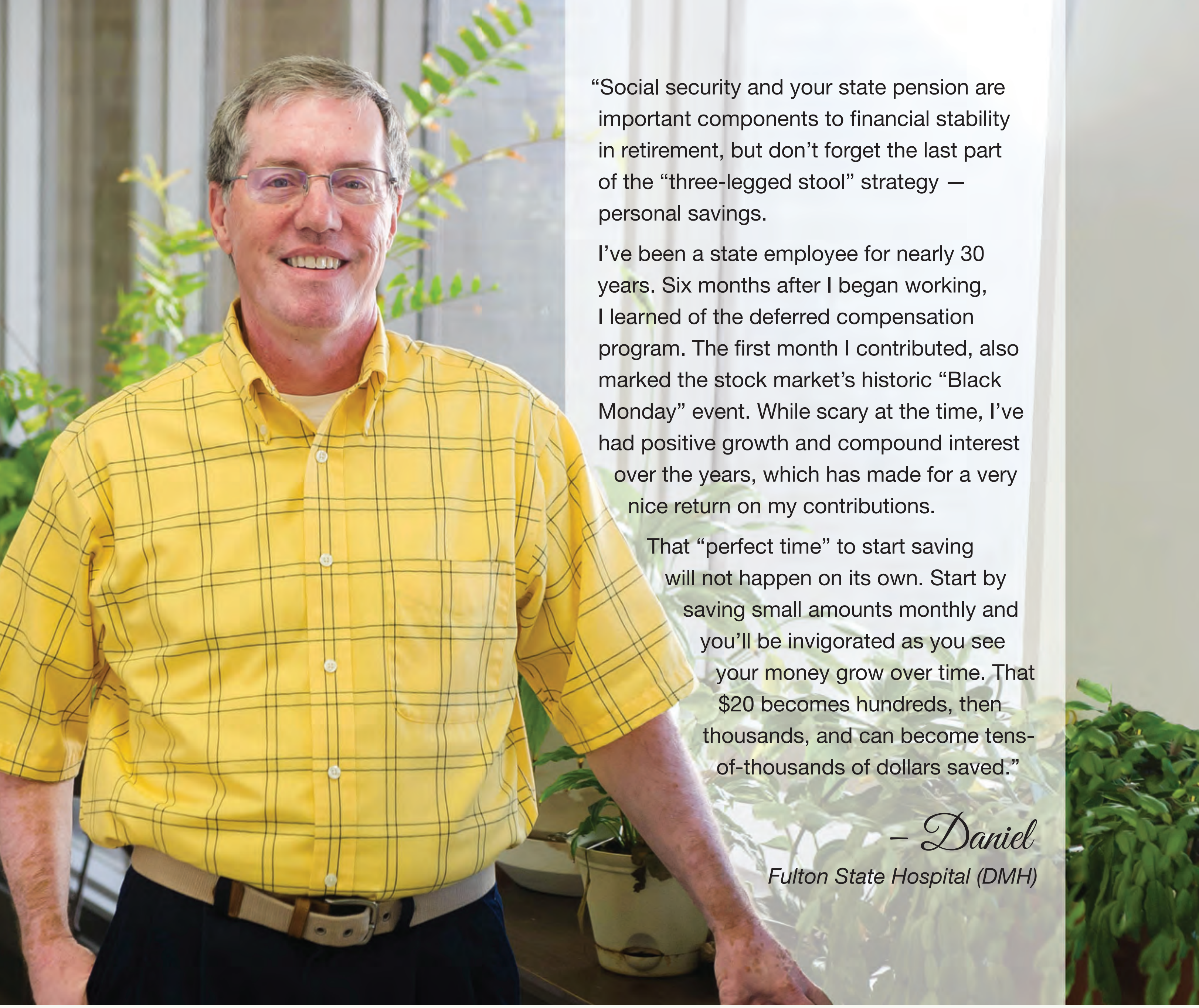
| Fiscal Year | Average Lendable | Average on Loan | Average Utilization | Lending Margin (Basis Points) | Net Income (Loss) |
|---|---|---|---|---|---|
| 2007 | $711,856,029 | $281,338,681 | 39.5% | 14.0 | $ 994,416 |
| 2008 | 440,025,347 | 195,971,154 | 44.5 | 36.6 | 1,611,536 |
| 2009 | 307,082,718 | 114,261,769 | 37.2 | 52.0 | 1,596,245 |
| 2010 | 321,114,801 | 83,944,408 | 26.1 | 26.9 | 864,401 |
| 2011 | 376,047,357 | 111,263,248 | 29.6 | 16.5 | 619,648 |
| 2012 | 424,041,044 | 145,373,164 | 34.3 | 19.1 | 810,972 |
| 2013 | 238,024,131 | 69,543,634 | 29.2 | 25.1 | 596,941 |
| 2014 | 187,154,236 | 62,768,614 | 33.5 | 22.6 | 422,422 |
| 2015 | 168,456,525 | 53,517,452 | 31.8 | 6.9 | 116,204 |
| 2016 | 117,553,687 | 36,503,528 | 31.1 | 0.0 | (49) |

### International Equity

| Fiscal Year | Average Lendable | Average on Loan | Average Utilization | Lending Margin (Basis Points) | Net Income |
|---|---|---|---|---|---|
| 2007 | $485,230,034 | $41,033,858 | 8.5% | 8.1 | $395,017 |
| 2008 | 467,893,205 | 56,994,925 | 12.2 | 15.5 | 726,565 |
| 2009 | 342,215,198 | 32,267,851 | 9.4 | 14.9 | 510,622 |
| 2010 | 277,251,343 | 19,736,528 | 7.1 | 4.0 | 109,946 |
| 2011 | 320,082,404 | 88,623,017 | 27.7 | 10.4 | 333,000 |
| 2012 | 309,052,299 | 47,666,253 | 15.4 | 7.5 | 230,655 |
| 2013 | 192,359,434 | 49,525,171 | 25.7 | 5.6 | 108,379 |
| 2014 | 0 | 0 | 0.0 | 0.0 | 0 |
| 2015 | 0 | 0 | 0.0 | 0.0 | 0 |
| 2016 | 0 | 0 | 0.0 | 0.0 | 0 |

### Fixed Income

| Fiscal Year | Average Lendable | Average on Loan | Average Utilization | Lending Margin (Basis Points) | Net Income |
|---|---|---|---|---|---|
| 2007 | $ 950,069,746 | $695,743,093 | 73.2% | 15.5 | $1,469,860 |
| 2008 | 1,082,813,165 | 894,372,380 | 82.6 | 56.4 | 6,104,526 |
| 2009 | 859,512,525 | 517,356,516 | 60.2 | 43.3 | 3,722,523 |
| 2010 | 836,242,270 | 190,547,907 | 22.8 | 2.8 | 230,031 |
| 2011 | 805,579,308 | 505,690,676 | 62.8 | 7.2 | 581,875 |
| 2012 | 776,256,144 | 516,553,974 | 66.5 | 6.4 | 496,074 |
| 2013 | 622,620,959 | 427,442,773 | 68.7 | 5.1 | 315,060 |
| 2014 | 247,256,630 | 185,527,243 | 75.0 | 4.4 | 108,552 |
| 2015 | 0 | 0 | 0.0 | 0.0 | 0 |
| 2016 | 0 | 0 | 0.0 | 0.0 | 0 |



"Social security and your state pension are important components to financial stability in retirement, but don't forget the last part of the "three-legged stool" strategy — personal savings.

I've been a state employee for nearly 30 years. Six months after I began working, I learned of the deferred compensation program. The first month I contributed, also marked the stock market's historic "Black Monday" event. While scary at the time, I've had positive growth and compound interest over the years, which has made for a very nice return on my contributions.

That "perfect time" to start saving will not happen on its own. Start by saving small amounts monthly and you'll be invigorated as you see your money grow over time. That $20 becomes hundreds, then thousands, and can become tens-of-thousands of dollars saved."

– *Daniel*

*Fulton State Hospital (DMH)*

*"That 'perfect time' to start saving will not happen on its own. Start by saving small amounts monthly and you'll be invigorated as you see your money grow over time."*

## Actuarial Section

## Actuary's Certification Letter

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October 14, 2016

The Board of Trustees
Missouri State Employees' Retirement System
907 Wildwood Drive
Jefferson City, Missouri 65109

Dear Board Members:

The basic financial objective of the Missouri State Employees' Retirement System (MOSERS), as stipulated under Missouri Revised Statutes 104.440 and 104.1066, is to establish and receive contributions which:

(1) when expressed in terms of percents of active member payroll will remain approximately level from generation to generation of Missouri citizens, and which

(2) when combined with present assets and future investment return will be sufficient to meet the present and future financial obligations of MOSERS.

In order to measure progress toward this fundamental objective, MOSERS performs annual actuarial valuations on the Missouri State Employees' Retirement Plan (MSEP) and the Judges Retirement Plan (Judicial Plan). The purposes of the valuations are to (i) measure present financial position, and (ii) establish contribution rates that provide for the normal cost and level percent of payroll amortization of unfunded actuarial accrued liabilities over a reasonable period. The latest completed actuarial valuations were based upon data and assumptions as of June 30, 2016, presented to the board in separate reports issued September 7, 2016 (Judicial Plan) and September 9, 2016 (MSEP). These valuations indicate that the calculated contribution rates for the fiscal year ending June 30, 2018, for the benefits scheduled to be in effect on and after July 1, 2016, meet the basic financial objective. These contribution rates are 19.45% of payroll for 49,464 active MSEP members, and 62.09% of payroll for 408 Judicial Plan members.

At the September 17, 2014, board meeting, the board adopted a minimum funding policy. Specifically, the minimum employer contribution rate will remain at the level calculated in the June 30, 2013, valuation until the respective plans are individually 80% funded. These contribution rates are 16.97% of payroll for active MSEP members, and 58.45% of payroll for Judicial Plan members, both of which are below the current rates and therefore do not apply.

The GASB 67 disclosures were issued on September 30, 2016, in a separate report due to the expressed intent of GASB to disconnect reporting requirements from funding requirements.

The actuarial valuations are based upon financial and participant data which is prepared by retirement system staff, assumptions regarding future rates of investment return, salary increases, inflation, and assumptions regarding rates of retirement, turnover, death, and disability among MSEP and Judicial Plan members and their beneficiaries. The data is reviewed by us for internal and year-to-year consistency as well as general reasonableness prior to its use in the actuarial valuations. It is also summarized and tabulated for the purpose of analyzing trends.

We are not responsible for the accuracy or completeness of the data. The demographic assumptions were adopted by the board of trustees on June 16, 2016, based upon recommendations made in an experience study covering the period from July 1, 2010 to June 30, 2015. The economic assumptions were adopted by the board of trustees on June 16, 2016. The assumptions and methods used in this valuation comply with the current actuarial standards of practice.

The benefit structure is outlined in the actuarial section of the annual report. We provided the information used in the supporting schedules in the *Actuarial Section*, and the *Schedule of Employers' Net Pension Liability*, *Sensitivity of Net Pension Liability to Changes in the Discount Rate*, *Schedule of Changes in Employers' Net Pension Liability* and the *Schedule of Employer Contributions* in the *Financial Section*.

**Based upon the valuation results, it is our opinion that the Missouri State Employees' Retirement Plan and the Judicial Retirement Plan continue to operate in accordance with actuarial principles of level percent of payroll financing. To the best of our knowledge the information contained in this report is accurate and fairly presents the actuarial position of the plans as of the valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board and with applicable statutes.**

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

This certification letter should not be relied on for any purpose other than the purposes described. Determinations of the financial results associated with the benefits described in this report in a manner other than the intended purpose may produce significantly different results.

David T. Kausch and Brad Lee Armstrong are independent of the plan sponsor and Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,

David T Kausch

David T. Kausch, FSA, EA, FCA, MAAA
Senior Consultant & Chief Actuary

Brad L Armstrong

Brad Lee Armstrong, ASA, EA, FCA, MAAA
Senior Consultant & Actuary

## Summary of Actuarial Assumptions

### Economic Assumptions

The economic assumptions were adopted by the board on June 16, 2016, to be first effective for the June 30, 2016, valuations. The assumed rate of return on investments used in the FY16 valuations was 7.65% per year, compounded annually (net after investment expenses). This assumption takes into consideration that equal amounts of money payable at different points in time in the future do not have the same value presently.

Pay increase assumptions for individual active members are shown for sample ages on pages 94 and 96. A portion of the assumption for each age represents merit and/or seniority increase, and the other 3% recognizes wage inflation. This assumption is used to project a member's current salary to the salaries upon which benefits will be based.

The active member payroll is assumed to increase 3% annually, which is the portion of the individual pay increase assumptions attributable to wage inflation. The annual cost-of-living adjustment (COLA) is assumed to be 4%, on a compounded basis, when a minimum COLA of 4% is in effect (4% for 12 years, 3.06% the next year to reach a cumulative 65% followed by 2%). When no minimum COLA is in effect, price inflation is assumed to be 2.5% and the annual COLA is assumed to be 2% (80% of 2.5%), on a compounded basis.

The table to the right provides the assumed rate of return (ARR) on investments, assumed price inflation (API), and real return objective (RRO) for the past ten valuation years.

| Valuation Year | ARR % | API % | RRO % |
|---|---|---|---|
| 2016 | 7.65% | 2.50% | 5.15% |
| 2015 | 8.00 | 2.50 | 5.50 |
| 2014 | 8.00 | 2.50 | 5.50 |
| 2013 | 8.00 | 2.50 | 5.50 |
| 2012 | 8.00 | 2.50 | 5.50 |
| 2011 | 8.50 | 3.20 | 5.30 |
| 2010 | 8.50 | 3.20 | 5.30 |
| 2009 | 8.50 | 3.20 | 5.30 |
| 2008 | 8.50 | 3.50 | 5.00 |
| 2007 | 8.50 | 3.50 | 5.00 |

### Non-Economic Assumptions

The demographic assumptions were adopted by the board on June 16, 2016, to be first effective for the June 30, 2016, valuation. The mortality table, for post-retirement mortality, used in evaluating allowances to be paid was the RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%. Related values are shown on pages 94 and 96. This assumption is used to measure the probabilities of each benefit payment being made after retirement. The pre-retirement mortality table used was the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females. The pre-retirement mortality table used for Long-Term Disability (LTD) members was the RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females.

The probabilities of age and service retirement are shown on page 95. It was assumed that each member will be granted 4 months (5 months for 2011 plan members) of service credit for unused leave upon retirement and 4 months of military service purchases (0 months for 2011 plan members). The probabilities of withdrawal from service, disability and death-in-service are shown on pages 94-96. For disability retirement, impaired longevity was recognized by use of special mortality tables.

The entry age normal actuarial cost method of valuation was used in determining liabilities and normal cost. Each member's normal cost was based on the benefit provisions applicable to that member. The normal cost is projected to the applicable fiscal year. Differences in the past between assumed experience and actuarial experience (actuarial gains and losses) become part of actuarial accrued liabilities. Unfunded actuarial accrued liabilities are amortized to produce payments, (principal and interest) which are level percents of payroll contributions.

The amortization of the unfunded actuarial accrued liability is based on a closed 30-year amortization period, level percent of payroll amortization. This method was first effective with the June 30, 2014 valuation. The amortization is based on the projected unfunded actuarial accrued liability to the beginning of the fiscal year during which the contributions are expected to be made. The unfunded accrued actuarial liability (UAAL) payment is calculated such that the minimum employer contribution rate will be at least 16.97% of payroll and 58.45% for judges (the rate calculated in the June 30, 2013 valuation) until such a time as each plan is a least 80% funded. When the plan become at least 80% funded, the remaining closed amortization period will be used to calculate the employer contribution rate to be made. Employer contribution dollars were assumed to be paid in equal installments throughout the employer's fiscal year.

The valuation assets used to determine funding requirements recognize assumed investment income fully each year. Differences between actual and assumed investment return are phased-in over an open five-year period. Valuation assets are not permitted to deviate from the market value by less than 80% or more than 125%.

The data about persons now covered and about present assets were furnished by the system's administrative staff. Although examined for general reasonableness, the data was not audited by the actuary.

The liabilities for active members hired on or after January 1, 2011, were based on MSEP 2011 benefits. The liabilities for active members hired on or after July 1, 2000, (April 26, 2005 for administrative law judges) were based on MSEP 2000 benefits. The liabilities for active members hired before July 1, 2000, for elected officials, General Assembly, and uniformed water patrol were based on MSEP benefits. The liabilities for all other active members hired before July 1, 2000, were based on the assumption that members would elect MSEP 2000 prior to age 62 and MSEP on or after age 62.

For members on long-term disability, the actuarial accrued liability is the present value of benefits under active assumptions and projecting salary by 3.0% (wage inflation assumption) per year from the year of disability to the current year to reflect indexing of pay in ultimate retirement benefits.

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (MAAA).

## MSEP - Retirement Values | June 30, 2016

| | Present Value of $1/Month the First Year (with 50% Joint & Survivor) Increasing 4.0%/2.0% Yearly | | Present Value of $1/Month the First Year Increasing 2.0% Yearly | | Future Life Expectancy (Years) | | | |
|---|---|---|---|---|---|---|---|---|
| | Old Plan COLA | | New Plan COLA | | Service | | Disability | |
| Sample Attained Ages | Men | Women | Men | Women | Men | Women | Men | Women |
| 40 | $232.55 | $233.39 | $188.71 | $192.71 | 40.95 | 43.52 | 31.67 | 37.37 |
| 45 | 224.67 | 225.75 | 180.96 | 186.10 | 36.33 | 38.90 | 28.24 | 33.43 |
| 50 | 215.04 | 216.17 | 171.72 | 177.90 | 31.84 | 34.33 | 25.02 | 29.63 |
| 55 | 203.45 | 204.34 | 160.97 | 167.90 | 27.52 | 29.85 | 21.99 | 26.06 |
| 60 | 189.59 | 189.93 | 148.53 | 155.96 | 23.38 | 25.49 | 19.08 | 22.66 |
| 65 | 172.99 | 172.53 | 133.99 | 141.77 | 19.40 | 21.29 | 16.23 | 19.25 |
| 70 | 153.41 | 152.07 | 117.23 | 125.31 | 15.62 | 17.28 | 13.44 | 15.89 |
| 75 | 131.21 | 128.92 | 98.73 | 106.89 | 12.13 | 13.56 | 10.80 | 12.77 |
| 80 | 107.27 | 104.17 | 79.34 | 87.21 | 9.03 | 10.22 | 8.40 | 10.01 |
| 85 | 83.33 | 79.90 | 60.48 | 67.65 | 6.42 | 7.37 | 6.33 | 7.71 |

## MSEP - Separations From Active Employment Before Service Retirement and Individual Pay Increase Assumptions | June 30, 2016

| | | Percent of Active Members Separating Within the Next Year | | | | | | Pay Increase Assumptions for an Individual Employee | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Withdrawal* | | Death** | | Disability | | | | | |
| Sample Ages | Years of Service | Men | Women | Men | Women | Men | Women | Years of Service | Merit and Seniority*** | Base (Economy) | Increase Next Year |
| | 0 | 24.0% | 27.5% | | | | | 1 | 5.75% | 3.00% | 8.75% |
| | 1 | 19.0 | 21.5 | | | | | 2 | 2.50 | 3.00 | 5.50 |
| | 2 | 15.5 | 16.3 | | | | | 3 | 1.50 | 3.00 | 4.50 |
| | 3 | 13.3 | 13.5 | | | | | 4 | 1.25 | 3.00 | 4.25 |
| | 4 | 11.2 | 11.3 | | | | | 5 | 1.00 | 3.00 | 4.00 |
| 25 | 5+ | 13.5 | 14.0 | 0.03% | 0.01% | 0.10% | 0.10% | 6 | 1.00 | 3.00 | 4.00 |
| 30 | | 10.6 | 11.0 | 0.03 | 0.02 | 0.10 | 0.10 | 7 | 1.00 | 3.00 | 4.00 |
| 35 | | 8.2 | 8.5 | 0.04 | 0.03 | 0.10 | 0.10 | 8 | 1.00 | 3.00 | 4.00 |
| 40 | | 5.8 | 6.0 | 0.05 | 0.03 | 0.36 | 0.36 | 9 | 0.75 | 3.00 | 3.75 |
| 45 | | 4.3 | 4.5 | 0.07 | 0.05 | 0.41 | 0.41 | 10 | 0.50 | 3.00 | 3.50 |
| 50 | | 2.9 | 3.0 | 0.13 | 0.08 | 0.57 | 0.57 | 15 | 0.50 | 3.00 | 3.50 |
| 55 | | 2.9 | 3.0 | 0.22 | 0.14 | 0.77 | 0.77 | 20 | 0.50 | 3.00 | 3.50 |
| 60 | | 2.9 | 3.0 | 0.40 | 0.20 | 1.02 | 1.02 | 25 | 0.25 | 3.00 | 3.25 |
| 65 | | 2.9 | 3.0 | 0.70 | 0.30 | 1.23 | 1.23 | 30 | 0.25 | 3.00 | 3.25 |
| 70 | | 2.9 | 3.0 | 1.17 | 0.50 | 1.23 | 1.23 | | | | |

* *Does not apply to elected officials and legislators.*

** *2% of the deaths in active service are assumed to be duty-related.*

*** *Does not apply to members of the General Assembly.*

*SUMMARY OF ACTUARIAL ASSUMPTIONS*

## MSEP - Percent of Eligible Active Members Retiring Next Year | June 30, 2016

| | Normal Retirement Pattern | | | | Early Retirement Pattern | | |
|---|---|---|---|---|---|---|---|
| | MSEP and MSEP 2000* | | | MSEP 2011** | | MSEP* | MSEP 2011** |
| | Percent Eligible | | | | | | |
| Retirement Age | 1st Year | 2nd Year | 3rd Year | Percent Eligible | Retirement Age | Percent Eligible | Percent Eligible |
| 48 | 20% | | | | | | |
| 49 | 20 | 10% | | | | | |
| 50 | 20 | 10 | 21% | | | | |
| 51 | 20 | 10 | 21 | | | | |
| 52 | 20 | 10 | 21 | | | | |
| 53 | 20 | 10 | 21 | | | | |
| 54 | 20 | 10 | 21 | | | | |
| 55 | 20 | 10 | 21 | 45% | | | |
| 56 | 20 | 10 | 21 | 45 | | | |
| 57 | 20 | 10 | 21 | 35 | 57 | 2.4% | |
| 58 | 20 | 10 | 21 | 35 | 58 | 3.1 | |
| 59 | 20 | 10 | 21 | 30 | 59 | 3.0 | |
| 60 | 20 | 10 | 21 | 35 | 60 | 5.1 | |
| 61 | 19 | 10 | 21 | 25 | 61 | 6.0 | |
| 62 | 18 | 22 | 29 | 40 | 62 | 6.0 | 10% |
| 63 | 16 | 18 | 24 | 30 | 63 | 6.0 | 10 |
| 64 | 15 | 17 | 17 | 20 | 64 | 6.0 | 10 |
| 65 | 19 | 19 | 27 | 30 | 65 | 6.0 | 50 |
| 66 | 24 | 25 | 28 | 25 | 66 | 6.0 | 50 |
| 67 | 10 | 25 | 23 | 20 | 67 | 6.0 | |
| 68 | 20 | 25 | 23 | 20 | 68 | 6.0 | |
| 69 | 20 | 25 | 23 | 20 | 69 | 6.0 | |
| 70 | 20 | 25 | 23 | 20 | 70 | 6.0 | |
| 71 | 20 | 25 | 23 | 20 | 71 | 6.0 | |
| 72 | 20 | 25 | 23 | 20 | 72 | 6.0 | |
| 73 | 20 | 25 | 23 | 20 | 73 | 6.0 | |
| 74 | 20 | 25 | 23 | 20 | 74 | 6.0 | |
| 75 | 50 | 50 | 23 | 50 | 75 | 6.0 | |
| 76 | 50 | 50 | 23 | 50 | 76 | 6.0 | |
| 77 | 75 | 75 | 23 | 75 | 77 | 6.0 | |
| 78 | 100 | 100 | 100 | 100 | 78 | 6.0 | |

* *For members hired prior to January 1, 2011.*
** *For members hired on or after January 1, 2011.*

## Elected Official and Legislators — Percent of Active Members Separating Within the Next Year | June 30, 2016

| Years of Service | Withdrawal Men/Women | Years of Service | Withdrawal Men/Women |
|---|---|---|---|
| 1 | 8.0% | 5 | 12.0% |
| 2 | 8.0 | 6 | 12.0 |
| 3 | 8.0 | 7 | 12.0 |
| 4 | 8.0 | 8+ | 35.0 |

## Judicial Plan - Retirement Values | June 30, 2016

| Sample Attained Ages | Present Value of $1/Month the First Year (with 50% Joint & Survivor) Increasing 4.0%/2.0% Yearly – Old Plan COLA: Men | Old Plan COLA: Women | Present Value of $1/Month the First Year Increasing 2.0% Yearly – New Plan COLA: Men | New Plan COLA: Women | Future Life Expectancy (Years) – Service: Men | Service: Women | Disability: Men | Disability: Women |
|---|---|---|---|---|---|---|---|---|
| 40 | $235.59 | $236.34 | $191.85 | $195.44 | 43.01 | 45.51 | 30.97 | 35.98 |
| 45 | 228.38 | 229.31 | 184.72 | 189.33 | 38.33 | 40.84 | 27.58 | 32.11 |
| 50 | 219.51 | 220.52 | 176.14 | 181.72 | 33.77 | 36.21 | 24.42 | 28.40 |
| 55 | 208.76 | 209.56 | 166.06 | 172.38 | 29.36 | 31.65 | 21.43 | 24.92 |
| 60 | 195.78 | 196.11 | 154.26 | 161.14 | 25.11 | 27.22 | 18.58 | 21.62 |
| 65 | 180.10 | 179.73 | 140.35 | 147.66 | 21.01 | 22.91 | 15.79 | 18.30 |
| 70 | 161.44 | 160.27 | 124.14 | 131.84 | 17.09 | 18.79 | 13.04 | 15.04 |
| 75 | 140.01 | 137.93 | 106.03 | 113.98 | 13.45 | 14.93 | 10.45 | 12.00 |
| 80 | 116.51 | 113.61 | 86.72 | 94.56 | 10.17 | 11.43 | 8.10 | 9.34 |
| 85 | 92.52 | 89.19 | 67.61 | 74.92 | 7.38 | 8.40 | 6.08 | 7.14 |

## Judicial Plan - Percent of Eligible Active Members Retiring Next Year | June 30, 2016

| Retirement Age | Normal Retirement Pattern – Judicial Plan* Percent Eligible: Men | Judicial Plan*: Women | Judicial Plan 2011** Percent Eligible: Men | Judicial Plan 2011**: Women | Early Retirement Pattern – Retirement Age | Judicial Plan* Percent Eligible: Men | Judicial Plan*: Women |
|---|---|---|---|---|---|---|---|
| 55 | 20% | 3% | | | | | |
| 56 | 16 | 3 | | | | | |
| 57 | 13 | 3 | | | | | |
| 58 | 9 | 3 | | | | | |
| 59 | 5 | 3 | | | | | |
| 60 | 8 | 8 | | | | | |
| 61 | 5 | 8 | | | | | |
| 62 | 8 | 8 | 30% | 35% | 62 | 6% | 3% |
| 63 | 10 | 8 | 20 | 20 | 63 | 6 | 3 |
| 64 | 12 | 8 | 15 | 20 | 64 | 6 | 3 |
| 65 | 12 | 15 | 30 | 50 | 65 | 6 | 3 |
| 66 | 20 | 15 | 25 | 25 | 66 | 6 | 3 |
| 67 | 20 | 15 | 20 | 25 | 67 | 6 | 3 |
| 68 | 30 | 15 | 20 | 25 | 68 | 6 | 3 |
| 69 | 30 | 15 | 30 | 50 | 69 | 6 | 3 |
| 70 | 100 | 100 | 100 | 100 | 70 | 100 | 100 |

* *For members hired prior to January 1, 2011*    ** *For members hired on or after January 1, 2011*

## Judicial Plan - Separations From Active Employment Before Service Retirement and Individual Pay Increase Assumptions | June 30, 2016

| Sample Ages | Percent of Active Members Separating Within the Next Year – Death: Men | Death: Women | Disability: Men | Disability: Woman | Pay Increase Assumptions for an Individual Employee – Merit and Seniority | Base (Economy) | Increase Next Year | Percent of Active Members Separating Within the Next Year – Withdrawal: Service Index | Withdrawal: Men | Withdrawal: Women |
|---|---|---|---|---|---|---|---|---|---|---|
| 25 | 0.03% | 0.01% | 0.01% | 0.01% | 2.20% | 3.00% | 5.20% | 1 | 0.040% | 0.040% |
| 30 | 0.03 | 0.02 | 0.02 | 0.01 | 2.20 | 3.00 | 5.20 | 2 | 0.010 | 0.023 |
| 35 | 0.04 | 0.03 | 0.03 | 0.02 | 1.48 | 3.00 | 4.48 | 3 | 0.013 | 0.023 |
| 40 | 0.05 | 0.04 | 0.04 | 0.03 | 0.76 | 3.00 | 3.76 | 4 | 0.013 | 0.023 |
| 45 | 0.07 | 0.05 | 0.05 | 0.04 | 0.60 | 3.00 | 3.60 | 5 | 0.013 | 0.023 |
| 50 | 0.13 | 0.09 | 0.08 | 0.07 | 0.54 | 3.00 | 3.54 | 6-10 | 0.013 | 0.023 |
| 55 | 0.24 | 0.16 | 0.13 | 0.12 | 0.44 | 3.00 | 3.44 | 11-15 | 0.017 | 0.023 |
| 60 | 0.42 | 0.23 | 0.20 | 0.19 | 0.00 | 3.00 | 3.00 | 16+ | 0.010 | 0.010 |
| 65 | 0.74 | 0.33 | 0.20 | 0.19 | 0.00 | 3.00 | 3.00 | | | |
| 70 | 1.23 | 0.55 | 0.20 | 0.19 | 0.00 | 3.00 | 3.00 | | | |

SUMMARY OF ACTUARIAL ASSUMPTIONS

## Miscellaneous Technical Assumptions | June 30, 2016

### Pay Increase Timing
Beginning of fiscal year.

### Decrement Timing
Decrements of all types are assumed to occur mid-year.

### Eligibility Testing
Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.

### Benefit Service
Exact fractional service is used to determine the amount of the benefit payable.

### Decrement Relativity
Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.

### Decrement Operation
Disability and withdrawal do not operate during normal retirement eligibility.

### Normal Form of Benefit
The assumed normal form of benefit is the straight life form for MSEP 2000 with 50% continuing to an eligible surviving spouse for MSEP. No adjustment has been made for post-retirement option election changes.

For judges, the assumed normal form of benefit is the straight life form, with 50% continuing to an eligible surviving spouse for members hired prior to January 1, 2011.

### Other Liability Adjustments
**Pre-Retirement Survivor Benefits for Spouse of Terminated Vested Member**

The factors used to estimate the cost of immediate unreduced survivor annuities upon the death of a vested member were updated based on prior experience.

Pre-Retirement Survivor Benefits for Spouse of Terminated-Vested Member

| Age | Male | Female |
|---|---|---|
| <30 | 1.57 | 1.31 |
| 30-39 | 1.24 | 1.13 |
| 40-49 | 1.09 | 1.05 |
| >50 | 1.02 | 1.01 |

### Incidence of Contributions
Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.

### MSEP 2000 Election
All regular state employees hired on or before June 30, 2000, are assumed to elect MSEP 2000 prior to age 62 and MSEP on or after age 62. Elected Officials, General Assembly, and Uniformed Water Patrol Members hired before July 1, 2000, and Administrative Law Judges hired before April 26, 2005, are assumed to elect MSEP at retirement.

### Service Adjustment
It is assumed that each member will be granted eight months of service credit, four months for unused leave upon retirement and four months for military service purchases. For members hired on or after January 1, 2011, it is assumed that each member will be granted five months for unused leave.

### Marriage Assumption
It is assumed that, among active members, 70% are married at retirement, 60% of those dying in active service are married, and men are three years older than their spouses.

### Forfeitures

For those hired on or after January 1, 2011, 50% of state employees terminating at first vesting eligibility are assumed to take a refund and forfeit their deferred pension. This percentage decreases to 0% at first retirement eligibility.

For judges, vested members are assumed not to take a refund of member contributions and forfeit their benefit upon separation from service.

### Salary and Benefit Limits

For purposes of the valuation, no limits were applied to member compensation or benefits.

The number of active members is assumed to remain constant although certain new hires on or after July 1, 2002, will participate in the Colleges and Universities Retirement Plan. Active and retired member data is reported as of May 31, 2016. It is assumed for valuation purposes that there is no turnover among members and no new entrants during the month of June 2016. New entrant assumed demographic patterns are based on the demographics of active members hired within the last three to eight years.

### Data Adjustments

Active and retired member data was reported as of May 31, 2016. It was brought forward to June 30, 2016, by adding one month of service for all active members and the June COLA for certain retired members. It is expected that this procedure resulted in a slight overstatement of total liabilities as of June 30, 2016. Financial information continues to be reported as of June 30. This procedure was instituted to provide sufficient time for the board of trustees to certify the appropriate contribution rate prior to the October 1 statutory deadline.

Active members reported with less than a $100 annualized salary were assumed to receive the average active member pay, which is $38,805 ($116,459 for Administrative Law Judges) as of June 30, 2016. There were 25 Regular State Employee members affected by this assumption.

For judges, active members reported with no annualized salary were assumed to receive the average active member pay, which is $140,738, as of June 30, 2016.

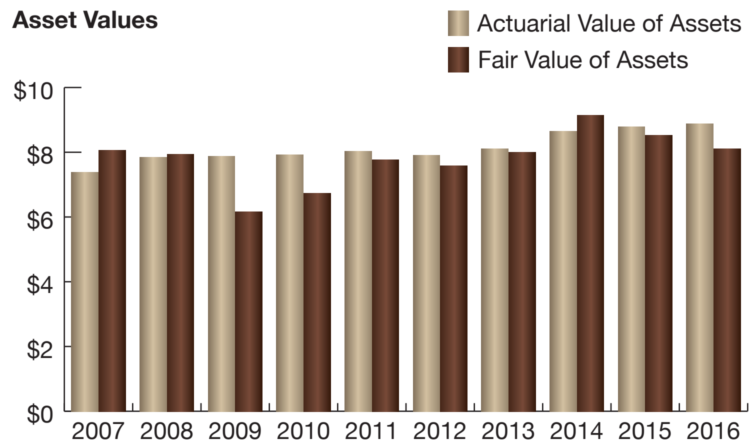
When the option of choosing plans is available, terminated vested members are reported with two records, one with benefits under the MSEP and one with benefits under the MSEP 2000. Because it is unknown what the member will elect at retirement, both records are valued and the plan that produces the higher present value of future benefits is used for valuation purposes.

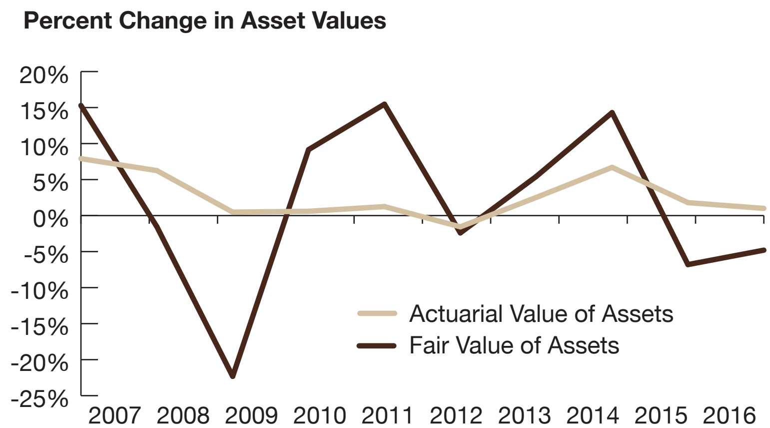
For any retired member who has elected a joint and survivor benefit yet has no beneficiary date of birth provided, it was assumed that the beneficiary is three years younger for male retirees and three years older for female retirees. For the terminated vested members, GRS staff found one member less than what was initially reported. This was confirmed with MOSERS' staff. For members reported with no gender, the member is assumed to be male.

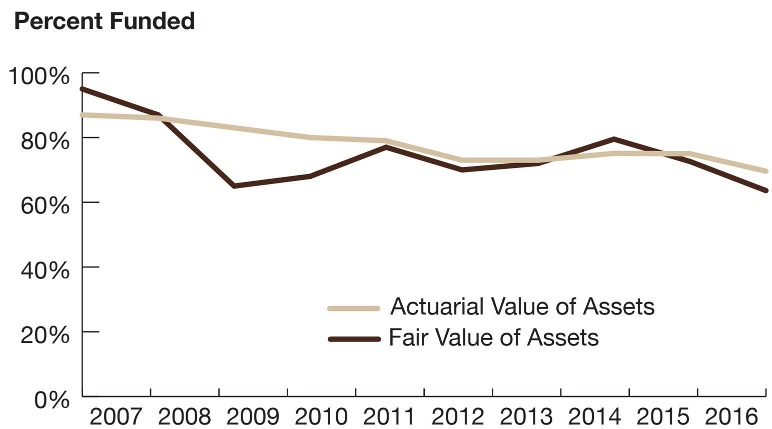
For judges, for any retired member who has elected a joint and survivor benefit yet has no beneficiary date of birth provided, it was assumed that the beneficiary is four years younger for male retirees and four years older for female retirees.

Due to limitations in our valuation program, members who are not eligible for normal retirement prior to age 85 had their date of birth adjusted.

## Actuarial Asset Value Smoothing




The financing objective of the vast majority of public retirement plans is to establish contribution rates and collect contributions which remain relatively level as a percent of active member payroll over decades of time. This concept is sometimes referred to as attempting to achieve intergenerational equity, meaning future generations will not be expected to pay more or less (in inflation adjusted terms) than the present generation contributes to support the plan.

Some critics of smoothing the actuarial value of assets suggest that pension plans are not providing "transparency" in connection with operations. Actual practice suggests otherwise. The *Statements of Fiduciary Net Position* and *Changes in Fiduciary Net Position* in the *Financial Section* are prepared on the basis of fair values. Beyond that, all information related to asset values and results of investment activity in the *Investment Section* of this report is prepared on the basis of fair values. This is required by the accounting and reporting standards established by the Governmental Accounting Standards Board and by the Government Finance Officers Association's *Guidelines for the Preparation of a Comprehensive Annual Financial Report*. Both organizations have been long-standing proponents of transparency in governmental accounting and reporting – public retirement plans commonly subscribe to the dictates of both.

Many public retirement plans have begun to emphasize use of asset classes that, by their nature, tend to be somewhat volatile in fair value. This is being done with the objective of increasing long-term investment returns, thus providing increased benefit security for plan participants and lower contribution rates for taxpayers than would otherwise be the case. With fair value accounting for contribution rate determination purposes, we could achieve more level contribution rates by employing lower volatility asset classes but the level contribution rate would be much higher than is the case with the higher return expectations we have as the result of taking on asset volatility risk.

When operating with a long-term time horizon, with contribution rate stability as a key objective, asset smoothing for actuarial purposes is simply a tool. Asset smoothing for actuarial purposes is a practical solution to responsibly achieving intergenerational equity, giving recognition to the fact that market cycles do not coincide with financial reporting periods. The use of the "market-related" value established through smoothing simply makes more sense for determining contribution rates than using fair value. The charts above further illustrate the impact of smoothing volatility in actuarial computations.

*Pension Trust Funds*

## **Employer Schedule of Funding Progress** | Last Ten Years

MOSERS uses the entry-age normal funding method. The entry-age normal actuarial cost method allocates the actuarial present value of each member's projected benefits on a level basis over the member's pensionable compensation between the entry age of the member and assumed exit ages.

### MSEP

| Actuarial Valuation Date | Actuarial Value of Assets (a) | Actuarial Accrued Liability (AAL) Entry Age (b) | Unfunded AAL (UAAL) (b-a) | Percent Funded (a/b) | Annual Covered Payroll (c) | UAAL Percentage of Covered Payroll [(b-a)/c] |
|---|---|---|---|---|---|---|
| 6/30/2007 | $7,377,289,283 | $ 8,500,428,641 | $1,123,139,358 | 86.8% | $1,846,643,330 | 60.8% |
| 6/30/2008 | 7,838,495,768 | 9,128,347,470 | 1,289,851,702 | 85.9 | 1,916,527,398 | 67.3 |
| 6/30/2009 | 7,876,079,342 | 9,494,806,715 | 1,618,727,373 | 83.0 | 2,002,402,087 | 80.8 |
| 6/30/2010 | 7,923,377,393 | 9,853,155,445 | 1,929,778,052 | 80.4 | 1,945,095,321 | 99.2 |
| 6/30/2011 | 8,022,481,408 | 10,123,544,043 | 2,101,062,635 | 79.2 | 1,875,569,816 | 112.0 |
| 6/30/2012 | 7,897,167,203 | 10,793,651,577 | 2,896,484,374 | 73.2 | 1,864,069,493 | 155.4 |
| 6/30/2013 | 8,096,436,929 | 11,134,637,484 | 3,038,200,555 | 72.7 | 1,880,212,950 | 161.6 |
| 6/30/2014 | 8,637,758,955 | 11,494,571,835 | 2,856,812,880 | 75.1 | 1,902,719,928 | 150.1 |
| 6/30/2015 | 8,792,485,658 | 11,727,618,410 | 2,935,132,752 | 75.0 | 1,918,527,768 | 153.0 |
| 6/30/2016 | 8,878,057,191 | 12,751,162,753 | 3,873,105,562 | 69.6 | 1,921,528,936 | 201.6 |

### Judicial Plan

| Actuarial Valuation Date | Actuarial Value of Assets (a) | Actuarial Accrued Liability (AAL) Entry Age (b) | Unfunded AAL (UAAL) (b-a) | Percent Funded (a/b) | Annual Covered Payroll (c) | UAAL Percentage of Covered Payroll [(b-a)/c] |
|---|---|---|---|---|---|---|
| 6/30/2007 | $ 61,903,516 | $326,666,373 | $264,762,857 | 19.0% | $40,846,581 | 648.2% |
| 6/30/2008 | 73,194,379 | 354,796,453 | 281,602,074 | 20.6 | 44,542,530 | 632.2 |
| 6/30/2009 | 81,337,881 | 369,106,841 | 287,768,960 | 22.0 | 45,505,512 | 632.4 |
| 6/30/2010 | 88,976,738 | 382,012,773 | 293,036,035 | 23.3 | 46,112,730 | 635.5 |
| 6/30/2011 | 98,398,628 | 393,484,589 | 295,085,961 | 25.0 | 45,888,020 | 643.1 |
| 6/30/2012 | 102,266,706 | 413,332,538 | 311,065,832 | 24.7 | 45,835,501 | 678.7 |
| 6/30/2013 | 111,140,339 | 435,378,358 | 324,238,019 | 25.5 | 48,697,726 | 665.8 |
| 6/30/2014 | 124,269,105 | 462,336,255 | 338,067,150 | 26.9 | 49,587,936 | 681.8 |
| 6/30/2015 | 134,349,908 | 482,969,311 | 348,619,403 | 27.8 | 55,656,457 | 626.4 |
| 6/30/2016 | 143,468,860 | 547,621,617 | 404,152,757 | 26.2 | 57,421,016 | 703.8 |

See *Required Notes to the Schedules of Supplementary Information.*
See accompanying *Independent Auditors' Report.*

*Pension Trust Funds*

## Summary of Member Data Included in Valuations | June 30, 2016

### Active Members

| Valuation Group | Number | Payroll | Group Averages: Salary | Age (Yrs.) | Service (Yrs.) |
|---|---|---|---|---|---|
| **MSEP** | | | | | |
| Regular state employees | 46,652 | $1,760,954,416 | $ 37,747 | 45.2 | 10.8 |
| Elected officials | 6 | 659,977 | 109,996 | 47.7 | 8.7 |
| Legislative clerks | 17 | 637,809 | 37,518 | 62.4 | 23.0 |
| Legislators | 194 | 6,978,820 | 35,973 | 52.7 | 5.1 |
| Uniformed water patrol | 11 | 721,310 | 65,574 | 40.7 | 15.1 |
| Conservation department | 1,371 | 59,149,578 | 43,143 | 44.5 | 14.2 |
| School-term salaried employees | 1,186 | 89,282,632 | 75,280 | 57.4 | 21.6 |
| Administrative law judges | 27 | 3,144,394 | 116,459 | 58.8 | 21.9 |
| Total MSEP group | 49,464 | $1,921,528,936 | $ 38,847 | 45.5 | 11.2 |
| **Judicial Plan** | 408 | $ 57,421,016 | $140,738 | 56.7 | 12.0 |

### Retired Lives

| Type of Benefit Payment | Number | Annual Benefits | Group Averages: Benefit | Age (Yrs.) |
|---|---|---|---|---|
| **MSEP** | | | | |
| Retirement | 39,799 | $623,139,988 | $15,657 | 69.7 |
| Disability | 4 | 14,640 | 3,660 | 63.0 |
| Survivor of active member | 1,658 | 17,580,693 | 10,604 | 62.4 |
| Survivor of retired member | 3,367 | 40,079,686 | 11,904 | 75.3 |
| Total MSEP group | 44,828 | $680,815,007 | $15,187 | 69.9 |
| **Judicial Plan** | 540 | $ 33,189,832 | $61,463 | 75.8 |

### Others

| Group | Terminated-Vested | Leave of Absence | Long-Term Disability |
|---|---|---|---|
| **MSEP** | 19,512 | 132 | 928 |
| **Judicial Plan** | 26 | 0 | 1 |

## Active Members by Attained Age and Years of Service | June 30, 2016

### MSEP

| | Years of Service to Valuation Date | | | | | | | Totals | |
|---|---|---|---|---|---|---|---|---|---|
| Attained Age | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | No. | Valuation Payroll |
| 15-19 | 94 | | | | | | | 94 | $ 2,396,533 |
| 20-24 | 2,049 | 6 | | | | | | 2,055 | 57,822,351 |
| 25-29 | 4,035 | 546 | 14 | | | | | 4,595 | 148,984,633 |
| 30-34 | 2,742 | 1,647 | 498 | 17 | | | | 4,904 | 174,216,818 |
| 35-39 | 2,027 | 1,409 | 1,374 | 543 | 16 | | | 5,369 | 202,764,305 |
| 40-44 | 1,562 | 1,127 | 1,108 | 1,446 | 425 | 20 | | 5,688 | 221,426,491 |
| 45-49 | 1,523 | 1,052 | 990 | 1,402 | 1,210 | 476 | 58 | 6,711 | 269,296,848 |
| 50-54 | 1,409 | 1,060 | 1,070 | 1,320 | 1,080 | 998 | 473 | 7,410 | 304,709,083 |
| 55-59 | 1,119 | 956 | 950 | 1,302 | 934 | 732 | 596 | 6,589 | 272,173,222 |
| 60 | 194 | 181 | 197 | 237 | 144 | 107 | 101 | 1,161 | 48,331,660 |
| 61 | 148 | 144 | 181 | 207 | 148 | 107 | 72 | 1,007 | 43,851,427 |
| 62 | 113 | 152 | 128 | 181 | 98 | 82 | 67 | 821 | 35,480,883 |
| 63 | 94 | 113 | 111 | 156 | 94 | 75 | 57 | 700 | 30,390,857 |
| 64 | 75 | 93 | 117 | 145 | 85 | 55 | 84 | 654 | 29,129,971 |
| 65 | 41 | 72 | 83 | 92 | 72 | 37 | 72 | 469 | 21,052,309 |
| 66 | 39 | 67 | 66 | 66 | 36 | 29 | 41 | 344 | 16,170,991 |
| 67 | 22 | 47 | 36 | 44 | 26 | 22 | 26 | 223 | 10,418,013 |
| 68 | 14 | 36 | 43 | 37 | 20 | 14 | 23 | 187 | 9,127,311 |
| 69 | 18 | 33 | 26 | 34 | 12 | 15 | 19 | 157 | 7,861,704 |
| 70+ | 35 | 51 | 59 | 55 | 52 | 24 | 50 | 326 | 15,923,526 |
| Totals | 17,353 | 8,792 | 7,051 | 7,284 | 4,452 | 2,793 | 1,739 | 49,464 | $1,921,528,936 |

*While not used in the financial computations, the following group averages are computed and shown because of their general interest.*
**Group Averages:** Age — 45.5 years • Service — 11.2 years • Annual pay — $38,847

### Judicial Plan

| | Years of Service to Valuation Date | | | | | | | Totals | |
|---|---|---|---|---|---|---|---|---|---|
| Attained Age | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30+ | No. | Valuation Payroll |
| 30-34 | 3 | | | | | | | 3 | $ 404,841 |
| 35-39 | 11 | 3 | | | | | | 14 | 1,902,279 |
| 40-44 | 14 | 9 | | | | | | 23 | 3,147,060 |
| 45-49 | 16 | 17 | 13 | 3 | | | | 49 | 6,717,896 |
| 50-54 | 22 | 19 | 7 | 12 | 4 | | | 64 | 9,004,582 |
| 55-59 | 26 | 27 | 8 | 25 | 11 | 2 | | 99 | 13,921,102 |
| 60 | | 1 | 1 | 2 | 3 | 3 | 1 | 11 | 1,607,823 |
| 61 | 2 | 6 | 3 | 3 | 3 | 1 | 1 | 19 | 2,661,687 |
| 62 | 2 | 5 | 1 | 2 | 6 | 6 | 2 | 24 | 3,471,439 |
| 63 | 2 | 5 | 2 | 1 | 5 | 1 | 2 | 18 | 2,556,053 |
| 64 | 1 | 3 | 3 | 7 | 4 | 1 | | 19 | 2,728,962 |
| 65 | 2 | 2 | 3 | 2 | 1 | | 2 | 12 | 1,682,881 |
| 66 | | 2 | 5 | 4 | 1 | 3 | 1 | 16 | 2,273,658 |
| 67 | | | 3 | 3 | 1 | | 2 | 9 | 1,288,528 |
| 68 | | 4 | | 6 | 5 | 2 | 1 | 18 | 2,623,156 |
| 69 | | 3 | | 2 | 3 | 1 | 1 | 10 | 1,429,069 |
| Totals | 101 | 106 | 49 | 72 | 47 | 20 | 13 | 408 | $57,421,016 |

*While not used in the financial computations, the following group averages are computed and shown because of their general interest.*
**Group Averages:** Age — 56.7 years • Service — 12.0 years • Annual pay — $140,738

## Schedules of Active Member Valuation Data | Ten Years Ended June 30, 2016

### MSEP

| | Schedule of Active Member Valuation Data | | | |
|---|---|---|---|---|
| Valuation Date | Number | Annual Payroll | Annual Average Pay | % Increase in Average Pay |
| June 30, 2007 | 54,363 | $1,846,643,330 | $33,969 | 4.15% |
| June 30, 2008 | 54,542 | 1,916,527,398 | 35,139 | 3.44 |
| June 30, 2009 | 55,057 | 2,002,402,087 | 36,370 | 3.50 |
| June 30, 2010 | 53,478 | 1,945,095,321 | 36,372 | 0.01 |
| June 30, 2011 | 51,660 | 1,875,569,816 | 36,306 | (0.18) |
| June 30, 2012 | 51,332 | 1,864,069,493 | 36,314 | 0.02 |
| June 30, 2013 | 50,833 | 1,880,212,950 | 36,988 | 1.86 |
| June 30, 2014 | 50,621 | 1,902,719,928 | 37,588 | 1.62 |
| June 30, 2015 | 49,980 | 1,918,527,768 | 38,386 | 2.12 |
| June 30, 2016 | 49,464 | 1,921,528,936 | 38,847 | 1.20 |

### Judicial Plan

| | Schedule of Active Member Valuation Data | | | |
|---|---|---|---|---|
| Valuation Date | Number | Annual Payroll | Annual Average Pay | % Increase in Average Pay |
| June 30, 2007 | 400 | $40,846,581 | $102,116 | (0.09)% |
| June 30, 2008 | 401 | 44,542,530 | 111,079 | 8.78 |
| June 30, 2009 | 397 | 45,505,512 | 114,623 | 3.19 |
| June 30, 2010 | 402 | 46,112,730 | 114,708 | 0.07 |
| June 30, 2011 | 399 | 45,888,020 | 115,008 | 0.26 |
| June 30, 2012 | 398 | 45,835,501 | 115,165 | 0.14 |
| June 30, 2013 | 400 | 48,697,726 | 121,744 | 5.71 |
| June 30, 2014 | 405 | 49,587,936 | 122,439 | 0.57 |
| June 30, 2015 | 405 | 55,656,457 | 137,423 | 12.24 |
| June 30, 2016 | 408 | 57,421,016 | 140,738 | 2.41 |

## **Retirees and Beneficiaries Added and Removed** | Ten Years Ended June 30, 2016*

MSEP

| | | | Added to Rolls | | Removed from Rolls | |
|---|---|---|---|---|---|---|
| Fiscal Year Ended | Classification | Benefit Type | Number | Annual Allowances | Number | Annual Allowances |
| June 30, 2009 | General employees | Retirement | 2,195 | $37,338,992 | 852 | $9,903,887 |
| | | Survivor of active | 82 | 996,258 | 54 | 390,167 |
| | | Survivor of retired | 251 | 3,077,466 | 110 | 827,564 |
| | | Disability | 0 | 876 | 1 | 4,237 |
| | Lincoln University - vested | Retirement | 0 | 0 | 0 | 0 |
| | | Survivor of active | 0 | 0 | 0 | 0 |
| | Legislators | Retirement | 21 | 746,414 | 8 | 120,396 |
| | | Survivor of active | 0 | 5,137 | 1 | 14,128 |
| | | Survivor of retired | 4 | 84,108 | 2 | 20,473 |
| | Elected officials | Retirement | 2 | 105,141 | 0 | 0 |
| | | Survivor of active | 0 | 2,997 | 0 | 0 |
| | | Survivor of retired | 0 | 1,274 | 0 | 0 |
| | ALJs | Retirement | 3 | 168,517 | 2 | 90,337 |
| | | Survivor of retired | 2 | 57,238 | 1 | 27,354 |
| June 30, 2010 | General employees | Retirement | 2,298 | 34,755,192 | 833 | 9,979,318 |
| | | Survivor of active | 83 | 1,054,292 | 49 | 276,401 |
| | | Survivor of retired | 246 | 3,080,424 | 117 | 1,078,265 |
| | | Disability | 0 | 830 | 1 | 2,985 |
| | Lincoln University - vested | Retirement | 1 | 5,671 | 0 | 0 |
| | | Survivor of active | 0 | 0 | 0 | 0 |
| | Legislators | Retirement | 12 | 201,562 | 12 | 239,880 |
| | | Survivor of active | 0 | 3,975 | 1 | 16,709 |
| | | Survivor of retired | 5 | 78,765 | 0 | 0 |
| | Elected officials | Retirement | 0 | 0 | 1 | 66,911 |
| | | Survivor of active | 0 | 3,117 | 0 | 0 |
| | | Survivor of retired | 1 | 34,780 | 0 | 0 |
| | ALJs | Retirement | 3 | 113,877 | 1 | 46,794 |
| | | Survivor of active | 0 | 0 | 0 | 0 |
| | | Survivor of retired | 0 | 7,332 | 0 | 0 |
| June 30, 2011 | General employees | Retirement | 2,850 | 41,203,358 | 892 | 10,670,476 |
| | | Survivor of active | 65 | 914,689 | 46 | 261,503 |
| | | Survivor of retired | 298 | 3,059,195 | 176 | 1,670,990 |
| | | Disability | 0 | 79 | 1 | 1,732 |
| | Lincoln University - vested | Retirement | 1 | 1,780 | 0 | 0 |
| | | Survivor of active | 0 | 0 | 0 | 0 |
| | Legislators | Retirement | 41 | 601,171 | 10 | 185,635 |
| | | Survivor of active | 0 | 2,903 | 1 | 19,612 |
| | | Survivor of retired | 5 | 73,841 | 2 | 16,628 |
| | Elected officials | Retirement | 0 | 0 | 0 | 0 |
| | | Survivor of active | 0 | 3,242 | 0 | 0 |
| | | Survivor of retired | 0 | 1,053 | 0 | 0 |
| | ALJs | Retirement | 4 | 212,519 | 0 | 0 |
| | | Survivor of active | 0 | 0 | 0 | 0 |
| | | Survivor of retired | 0 | 2,599 | 1 | 27,724 |
| June 30, 2012 | General employees | Retirement | 2,637 | 39,423,910 | 895 | 11,116,063 |
| | | Survivor of active | 82 | 1,129,634 | 34 | 197,452 |
| | | Survivor of retired | 282 | 3,665,503 | 158 | 1,416,283 |
| | | Disability | 0 | 458 | 0 | 0 |
| | Lincoln University - vested | Retirement | 0 | 0 | 2 | 11,032 |
| | | Survivor of active | 0 | 0 | 0 | 0 |
| | Legislators | Retirement | 13 | 229,979 | 8 | 139,545 |
| | | Survivor of active | 0 | 3,531 | 0 | 0 |
| | | Survivor of retired | 4 | 80,142 | 3 | 52,550 |
| | Elected officials | Retirement | 2 | 86,431 | 0 | 0 |
| | | Survivor of active | 0 | 3,371 | 0 | 0 |
| | | Survivor of retired | 0 | 1,336 | 0 | 0 |
| | ALJs | Retirement | 3 | 124,248 | 3 | 158,072 |
| | | Survivor of active | 1 | 25,592 | 0 | 0 |
| | | Survivor of retired | 2 | 57,704 | 0 | 0 |

** Schedule is intended to show information for10 years. Additional years will be displayed as they become available.*

*Source of Data: MOSERS benefit payment database as of June 30, 2016.*
*Other Actuarial Section information reported based on MOSERS data as of May 31, 2016.*

| Rolls at End of Year | | | | |
|---|---|---|---|---|
| Number | Annual Allowances | Percentage Increase (Decrease) in Annual Allowances | Average Annual Allowances | Percentage Increase (Decrease) in Average Annual Allowances |
| 27,942 | $425,200,398 | 6.90% | $15,217 | 1.76% |
| 1,364 | 12,095,246 | 5.28 | 8,867 | 3.10 |
| 2,259 | 22,538,130 | 11.09 | 9,977 | 4.15 |
| 10 | 33,055 | (9.23) | 3,306 | (0.15) |
| 13 | 55,953 | 0.00 | 4,304 | 0.00 |
| 1 | 2,624 | 0.00 | 2,624 | 0.00 |
| 262 | 5,207,953 | 13.66 | 19,878 | 8.03 |
| 13 | 146,210 | (5.79) | 11,247 | 1.45 |
| 56 | 771,979 | 8.98 | 13,785 | 5.09 |
| 14 | 620,135 | 20.42 | 44,295 | 3.21 |
| 1 | 77,924 | 4.00 | 77,924 | 4.00 |
| 1 | 33,117 | 4.00 | 33,117 | 4.00 |
| 26 | 1,177,522 | 7.11 | 45,289 | 2.99 |
| 11 | 275,852 | 12.15 | 25,077 | 1.95 |
| 29,407 | 449,976,272 | 5.83 | 15,302 | 0.56 |
| 1,398 | 12,873,137 | 6.43 | 9,208 | 3.85 |
| 2,388 | 24,540,289 | 8.88 | 10,277 | 3.01 |
| 9 | 30,900 | (6.52) | 3,433 | 3.84 |
| 14 | 61,624 | 10.14 | 4,402 | 2.28 |
| 1 | 2,624 | 0.00 | 2,624 | 0.00 |
| 262 | 5,169,635 | (0.74) | 19,731 | (0.74) |
| 12 | 133,476 | (8.71) | 11,123 | (1.10) |
| 61 | 850,744 | 10.20 | 13,947 | 1.18 |
| 13 | 553,224 | (10.79) | 42,556 | (3.93) |
| 1 | 81,041 | 4.00 | 81,041 | 4.00 |
| 2 | 67,897 | 105.02 | 33,949 | 2.51 |
| 28 | 1,244,605 | 5.70 | 44,450 | (1.85) |
| 0 | 0 | 0.00 | 0 | 0.00 |
| 11 | 283,184 | 2.66 | 25,744 | 2.66 |
| 31,365 | 480,509,154 | 6.79 | 15,320 | 0.12 |
| 1,417 | 13,526,323 | 5.07 | 9,546 | 3.67 |
| 2,510 | 25,928,494 | 5.66 | 10,330 | 0.52 |
| 8 | 29,247 | (5.35) | 3,656 | 6.50 |
| 15 | 63,404 | 2.89 | 4,227 | (3.98) |
| 1 | 2,624 | 0.00 | 2,624 | 0.00 |
| 293 | 5,585,171 | 8.04 | 19,062 | (3.39) |
| 11 | 116,767 | (12.52) | 10,615 | (4.57) |
| 64 | 907,957 | 6.73 | 14,187 | 1.72 |
| 13 | 553,224 | 0.00 | 42,556 | 0.00 |
| 1 | 84,283 | 4.00 | 84,283 | 4.00 |
| 2 | 68,950 | 1.55 | 34,475 | 1.55 |
| 32 | 1,457,124 | 17.08 | 45,535 | 2.44 |
| 0 | 0 | 0.00 | 0 | 0.00 |
| 10 | 258,059 | (8.87) | 25,806 | 0.24 |
| 33,107 | 508,817,001 | 5.89 | 15,369 | 0.32 |
| 1,465 | 14,458,505 | 6.89 | 9,869 | 3.38 |
| 2,634 | 28,177,714 | 8.67 | 10,698 | 3.56 |
| 8 | 29,705 | 1.57 | 3,713 | 1.56 |
| 13 | 52,372 | (17.40) | 4,029 | (4.68) |
| 1 | 2,624 | 0.00 | 2,624 | 0.00 |
| 298 | 5,675,605 | 1.62 | 19,046 | (0.08) |
| 11 | 120,298 | 3.02 | 10,936 | 3.02 |
| 65 | 935,549 | 3.04 | 14,393 | 1.45 |
| 15 | 639,655 | 15.62 | 42,644 | 0.21 |
| 1 | 87,654 | 4.00 | 87,654 | 4.00 |
| 2 | 70,286 | 1.94 | 35,143 | 1.94 |
| 32 | 1,423,300 | (2.32) | 44,478 | (2.32) |
| 1 | 25,592 | 0.00 | 25,592 | 0.00 |
| 12 | 315,763 | 22.36 | 26,314 | 1.97 |

*Retirees and Beneficiaries Added and Removed continued on pages 106-107.*

*Retirees and Beneficiaries Added and Removed continued from pages 104-105.*

MSEP

| | | | Added to Rolls | | Removed from Rolls | |
|---|---|---|---|---|---|---|
| Fiscal Year Ended | Classification | Benefit Type | Number | Annual Allowances | Number | Annual Allowances |
| June 30, 2013 | General employees | Retirement | 2,632 | $40,416,533 | 983 | $12,869,826 |
| | | Survivor of active | 97 | 1,080,366 | 64 | 400,983 |
| | | Survivor of retired | 323 | 4,085,887 | 150 | 1,363,799 |
| | | Disability | 0 | 696 | 1 | 3,854 |
| | Lincoln University - vested | Retirement | 2 | 5,980 | 0 | 0 |
| | | Survivor of active | 0 | 0 | 0 | 0 |
| | Legislators | Retirement | 37 | 442,937 | 15 | 320,292 |
| | | Survivor of active | 0 | 3,851 | 0 | 0 |
| | | Survivor of retired | 9 | 176,283 | 6 | 88,725 |
| | Elected officials | Retirement | 1 | 53,873 | 0 | 0 |
| | | Survivor of active | 0 | 3,506 | 0 | 0 |
| | | Survivor of retired | 0 | 1,458 | 0 | 0 |
| | ALJs | Retirement | 4 | 233,124 | 2 | 111,466 |
| | | Survivor of active | 0 | 1,024 | 0 | 0 |
| | | Survivor of retired | 2 | 65,892 | 1 | 22,759 |
| June 30, 2014 | General employees | Retirement | 2,612 | 37,411,991 | 944 | 12,205,892 |
| | | Survivor of active | 90 | 1,095,464 | 34 | 262,401 |
| | | Survivor of retired | 324 | 3,954,360 | 157 | 1,504,423 |
| | | Disability | 0 | 408 | 2 | 7,391 |
| | Lincoln University - vested | Retirement | 0 | 0 | 0 | 0 |
| | | Survivor of active | 0 | 0 | 0 | 0 |
| | Legislators | Retirement | 18 | 239,904 | 7 | 95,748 |
| | | Survivor of active | 0 | 3,680 | 0 | 0 |
| | | Survivor of retired | 5 | 39,520 | 5 | 44,445 |
| | Elected officials | Retirement | 0 | 0 | 1 | 19,605 |
| | | Survivor of active | 0 | 2,788 | 0 | 0 |
| | | Survivor of retired | 1 | 10,811 | 0 | 0 |
| | ALJs | Retirement | 1 | 50,072 | 2 | 78,138 |
| | | Survivor of active | 1 | 27,358 | 0 | 0 |
| | | Survivor of retired | 0 | 7,404 | 1 | 30,930 |
| June 30, 2015 | General employees | Retirement | 2,865 | 43,527,132 | 1,061 | 13,940,436 |
| | | Survivor of active | 111 | 1,160,798 | 56 | 434,928 |
| | | Survivor of retired | 350 | 4,399,848 | 180 | 1,673,736 |
| | | Disability | 0 | 180 | 1 | 5,220 |
| | Lincoln University - vested | Retirement | 1 | 2,340 | 0 | 0 |
| | | Survivor of active | 0 | 0 | 0 | 0 |
| | Legislators | Retirement | 16 | 236,916 | 4 | 130,116 |
| | | Survivor of active | 0 | 3,432 | 1 | 15,180 |
| | | Survivor of retired | 3 | 61,956 | 9 | 79,944 |
| | Elected officials | Retirement | 0 | 0 | 0 | 0 |
| | | Survivor of active | 1 | 15,802 | 0 | 0 |
| | | Survivor of retired | 0 | 0 | 0 | 0 |
| | ALJs | Retirement | 3 | 128,952 | 0 | 0 |
| | | Survivor of active | 0 | 1,452 | 0 | 0 |
| | | Survivor of retired | 0 | 6,612 | 0 | 0 |
| June 30, 2016 | General employees | Retirement | 2,815 | 40,917,948 | 1,147 | 15,381,612 |
| | | Survivor of active | 101 | 1,023,096 | 56 | 377,484 |
| | | Survivor of retired | 365 | 4,493,892 | 222 | 2,073,192 |
| | | Disability | 0 | 108 | 0 | 0 |
| | Lincoln University - vested | Retirement | 1 | 3,444 | 1 | 3,936 |
| | | Survivor of active | 0 | 0 | 0 | 0 |
| | Legislators | Retirement | 8 | 107,412 | 15 | 427,428 |
| | | Survivor of active | 0 | 3,084 | 0 | 0 |
| | | Survivor of retired | 7 | 173,760 | 3 | 50,448 |
| | Elected officials | Retirement | 0 | 0 | 0 | 0 |
| | | Survivor of active | 0 | 0 | 0 | 0 |
| | | Survivor of retired | 0 | 0 | 0 | 0 |
| | ALJs | Retirement | 5 | 230,472 | 2 | 150,888 |
| | | Survivor of active | 0 | 1,176 | 0 | 0 |
| | | Survivor of retired | 2 | 84,588 | 2 | 62,220 |

* *Schedule is intended to show information for10 years. Additional years will be displayed as they become available.*

*Source of Data: MOSERS benefit payment database as of June 30, 2016.*
*Other Actuarial Section information reported based on MOSERS data as of May 31, 2016.*

| Rolls at End of Year | | | | |
|---|---|---|---|---|
| Number | Annual Allowances | Percentage Increase (Decrease) in Annual Allowances | Average Annual Allowances | Percentage Increase (Decrease) in Average Annual Allowances |
| 34,756 | $536,363,708 | 5.41% | $15,432 | 0.41% |
| 1,498 | 15,137,889 | 4.70 | 10,105 | 2.39 |
| 2,807 | 30,899,802 | 9.66 | 11,008 | 2.90 |
| 7 | 26,546 | (10.63) | 3,792 | 2.13 |
| 15 | 58,351 | 11.42 | 3,890 | (3.45) |
| 1 | 2,623 | (0.04) | 2,623 | (0.04) |
| 320 | 5,798,251 | 2.16 | 18,120 | (4.86) |
| 11 | 124,149 | 3.20 | 11,286 | 3.20 |
| 68 | 1,023,107 | 9.36 | 15,046 | 4.54 |
| 16 | 693,528 | 8.42 | 43,346 | 1.65 |
| 1 | 91,160 | 4.00 | 91,160 | 4.00 |
| 2 | 71,744 | 2.07 | 35,872 | 2.07 |
| 34 | 1,544,957 | 8.55 | 45,440 | 2.16 |
| 1 | 26,615 | 4.00 | 26,615 | 4.00 |
| 13 | 358,896 | 13.66 | 27,607 | 4.91 |
| 36,424 | 561,569,807 | 4.70 | 15,418 | (0.09) |
| 1,554 | 15,970,952 | 5.50 | 10,277 | 1.70 |
| 2,974 | 33,349,739 | 7.93 | 11,214 | 1.87 |
| 5 | 19,563 | (26.31) | 3,913 | 3.19 |
| 15 | 58,351 | 0.00 | 3,890 | 0.00 |
| 1 | 2,623 | 0.00 | 2,623 | 0.00 |
| 331 | 5,942,407 | 2.49 | 17,953 | (0.92) |
| 11 | 127,829 | 2.96 | 11,621 | 2.97 |
| 68 | 1,018,182 | (0.48) | 14,973 | (0.49) |
| 15 | 673,923 | (2.83) | 44,928 | 3.65 |
| 1 | 93,948 | 3.06 | 93,948 | 3.06 |
| 3 | 82,555 | 15.07 | 27,518 | (23.29) |
| 33 | 1,516,891 | (1.82) | 45,966 | 1.16 |
| 2 | 53,973 | 102.79 | 26,987 | 1.40 |
| 12 | 335,370 | (6.56) | 27,948 | 1.24 |
| 38,227 | 591,156,503 | 5.27 | 15,464 | 0.30 |
| 1,608 | 16,696,822 | 4.54 | 10,384 | 1.04 |
| 3,144 | 36,075,851 | 8.17 | 11,475 | 2.33 |
| 4 | 14,523 | (25.76) | 3,631 | (7.21) |
| 16 | 60,691 | 4.01 | 3,793 | (2.49) |
| 1 | 2,623 | 0.00 | 2,623 | 0.00 |
| 339 | 6,049,207 | 1.80 | 17,844 | (0.61) |
| 10 | 116,081 | (9.19) | 11,608 | (0.11) |
| 66 | 1,000,194 | (1.77) | 15,154 | 1.21 |
| 15 | 673,923 | 0.00 | 44,928 | 0.00 |
| 2 | 109,750 | 16.82 | 54,875 | (41.59) |
| 3 | 82,555 | 0.00 | 27,518 | 0.00 |
| 36 | 1,645,843 | 8.50 | 45,718 | (0.54) |
| 2 | 55,425 | 2.69 | 27,713 | 2.69 |
| 12 | 341,982 | 1.97 | 28,499 | 1.97 |
| 39,895 | 616,692,839 | 4.32 | 15,458 | (0.04) |
| 1,653 | 17,342,434 | 3.87 | 10,491 | 1.03 |
| 3,287 | 38,496,551 | 6.71 | 11,712 | 2.07 |
| 4 | 14,631 | 0.74 | 3,658 | 0.74 |
| 16 | 60,199 | (0.81) | 3,762 | (0.82) |
| 1 | 2,623 | 0.00 | 2,623 | 0.00 |
| 332 | 5,729,191 | (5.29) | 17,257 | (3.29) |
| 10 | 119,165 | 2.66 | 11,917 | 2.66 |
| 70 | 1,123,506 | 12.33 | 16,050 | 5.91 |
| 15 | 673,923 | 0.00 | 44,928 | 0.00 |
| 2 | 109,750 | 0.00 | 54,875 | 0.00 |
| 3 | 82,555 | 0.00 | 27,518 | 0.00 |
| 39 | 1,725,427 | 4.84 | 44,242 | (3.23) |
| 2 | 56,601 | 2.12 | 28,301 | 2.12 |
| 12 | 364,350 | 6.54 | 30,363 | 6.54 |

## **Retirees and Beneficiaries Added and Removed** | Ten Years Ended June 30, 2016*

### Judicial Plan

| Fiscal Year Ended | Benefit Type | Added to Rolls Number | Added to Rolls Annual Allowances | Removed from Rolls Number | Removed from Rolls Annual Allowances |
|---|---|---|---|---|---|
| June 30, 2009 | Retirement | 30 | $1,922,615 | 15 | $ 957,943 |
| | Survivor of active | 1 | 59,484 | 0 | 0 |
| | Survivor of retired | 9 | 418,266 | 2 | 61,344 |
| June 30, 2010 | Retirement | 12 | 1,137,305 | 13 | 750,021 |
| | Survivor of active | 0 | 32,700 | 2 | 32,399 |
| | Survivor of retired | 11 | 436,312 | 5 | 130,920 |
| June 30, 2011 | Retirement | 36 | 2,501,248 | 9 | 563,214 |
| | Survivor of active | 0 | 14,893 | 1 | 35,792 |
| | Survivor of retired | 4 | 167,535 | 9 | 206,465 |
| June 30, 2012 | Retirement | 18 | 1,490,554 | 14 | 1,074,572 |
| | Survivor of active | 0 | 22,717 | 0 | 0 |
| | Survivor of retired | 8 | 371,622 | 6 | 218,310 |
| June 30, 2013 | Retirement | 27 | 2,233,387 | 13 | 851,802 |
| | Survivor of active | 0 | 28,591 | 1 | 33,778 |
| | Survivor of retired | 8 | 355,101 | 10 | 288,980 |
| June 30, 2014 | Retirement | 18 | 1,671,667 | 8 | 443,807 |
| | Survivor of active | 2 | 66,272 | 0 | 0 |
| | Survivor of retired | 5 | 254,117 | 7 | 216,813 |
| June 30, 2015 | Retirement | 39 | 3,599,880 | 21 | 1,395,888 |
| | Survivor of active | 0 | 34,344 | 0 | 0 |
| | Survivor of retired | 18 | 705,444 | 5 | 198,348 |
| June 30, 2016 | Retirement | 16 | 1,671,084 | 14 | 1,078,356 |
| | Survivor of active | 0 | 15,072 | 1 | 43032 |
| | Survivor of retired | 8 | 368,868 | 10 | 354,144 |

** Schedule is intended to show information for 10 years. Additional years will be displayed as they become available.*

| Rolls at End of Year | | | | |
|---|---|---|---|---|
| Number | Annual Allowances | Percentage Increase (Decrease) in Annual Allowances | Average Annual Allowances | Percentage Increase (Decrease) in Average Annual Allowances |
| 326 | $19,624,545 | 5.17% | $60,198 | 0.33% |
| 37 | 1,056,425 | 5.97 | 28,552 | 3.10 |
| 103 | 3,139,829 | 12.83 | 30,484 | 5.16 |
| 325 | 20,011,829 | 1.97 | 61,575 | 2.29 |
| 35 | 1,056,726 | 0.03 | 30,192 | 5.74 |
| 109 | 3,445,221 | 9.73 | 31,608 | 3.69 |
| 352 | 21,949,863 | 9.68 | 62,358 | 1.27 |
| 34 | 1,035,827 | (1.98) | 30,466 | 0.91 |
| 104 | 3,406,291 | (1.13) | 32,753 | 3.62 |
| 356 | 22,365,845 | 1.90 | 62,825 | 0.75 |
| 34 | 1,058,544 | 2.19 | 31,134 | 2.19 |
| 106 | 3,559,603 | 4.50 | 33,581 | 2.53 |
| 370 | 23,747,431 | 6.18 | 64,182 | 2.16 |
| 33 | 1,053,358 | (0.49) | 31,920 | 2.52 |
| 104 | 3,625,723 | 1.86 | 34,863 | 3.82 |
| 380 | 24,975,291 | 5.17 | 65,724 | 2.40 |
| 35 | 1,119,630 | 6.29 | 31,989 | 0.22 |
| 102 | 3,663,027 | 1.03 | 35,912 | 3.01 |
| 398 | 25,951,423 | 9.28 | 65,205 | 1.59 |
| 35 | 1,087,702 | 3.26 | 31,077 | (2.64) |
| 115 | 4,132,819 | 13.99 | 35,938 | 3.08 |
| 400 | 26,544,151 | 2.28 | 66,360 | 1.77 |
| 34 | 1,059,742 | (2.57) | 31,169 | 0.30 |
| 113 | 4,147,543 | 0.36 | 36,704 | 2.13 |

## Short-Term Solvency Test | Ten Years Ended June 30, 2016

### MSEP

| Fiscal Year | Actuarial Accrued Liabilities for: Member Contributions (1) | Current Retirees and Beneficiaries (2) | Active and Inactive Members, Employer Financed Portion (3) | Actuarial Value of Assets Available for Benefits | Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for (1) | (2) | (3) |
|---|---|---|---|---|---|---|---|
| 2007 | $ 0 | $4,208,621,537 | $4,291,807,104 | $7,377,289,283 | 100.0% | 100.0% | 73.8% |
| 2008 | 0 | 4,408,682,437 | 4,719,665,033 | 7,838,495,768 | 100.0 | 100.0 | 72.7 |
| 2009 | 0 | 4,737,859,976 | 4,756,946,739 | 7,876,079,342 | 100.0 | 100.0 | 66.0 |
| 2010 | 0 | 5,012,677,769 | 4,840,477,676 | 7,923,377,393 | 100.0 | 100.0 | 60.1 |
| 2011 | 67,126 | 5,357,794,617 | 4,765,682,300 | 8,022,481,408 | 100.0 | 100.0 | 55.9 |
| 2012 | 706,422 | 5,749,411,068 | 5,043,534,087 | 7,897,167,203 | 100.0 | 100.0 | 42.6 |
| 2013 | 1,504,901 | 6,062,654,441 | 5,070,478,142 | 8,096,436,929 | 100.0 | 100.0 | 40.1 |
| 2014 | 2,133,130 | 6,347,728,717 | 5,144,706,988 | 8,637,758,955 | 100.0 | 100.0 | 44.5 |
| 2015 | 2,452,605 | 6,695,631,737 | 5,029,504,068 | 8,792,485,658 | 100.0 | 100.0 | 41.6 |
| 2016 | 1,776,133 | 7,305,895,284 | 5,443,491,336 | 8,878,057,191 | 100.0 | 100.0 | 28.8 |

### Judicial Plan

| Fiscal Year | Actuarial Accrued Liabilities for: Member Contributions (1) | Current Retirees and Beneficiaries (2) | Active and Inactive Members, Employer Financed Portion (3) | Actuarial Value of Assets Available for Benefits | Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for (1) | (2) | (3) |
|---|---|---|---|---|---|---|---|
| 2007 | $ 0 | $199,489,503 | $127,176,870 | $ 61,903,516 | 100.0% | 31.0% | 0.0% |
| 2008 | 0 | 216,369,879 | 138,426,574 | 73,194,379 | 100.0 | 33.8 | 0.0 |
| 2009 | 0 | 231,505,591 | 137,601,250 | 81,337,881 | 100.0 | 35.1 | 0.0 |
| 2010 | 0 | 236,113,077 | 145,899,696 | 88,976,738 | 100.0 | 37.7 | 0.0 |
| 2011 | 284 | 251,532,354 | 141,951,951 | 98,398,628 | 100.0 | 39.1 | 0.0 |
| 2012 | 795 | 258,642,149 | 154,689,594 | 102,266,706 | 100.0 | 39.5 | 0.0 |
| 2013 | 2,924 | 274,911,416 | 160,464,018 | 111,140,339 | 100.0 | 40.4 | 0.0 |
| 2014 | 5,717 | 285,124,436 | 177,206,102 | 124,269,105 | 100.0 | 43.6 | 0.0 |
| 2015 | 8,691 | 316,042,514 | 166,918,106 | 134,349,908 | 100.0 | 42.5 | 0.0 |
| 2016 | 4,933 | 354,715,048 | 192,901,636 | 143,468,860 | 100.0 | 40.4 | 0.0 |

## **Analysis of Financial Experience** | Year Ended June 30, 2016

Actual experience will never coincide exactly with assumed experience (except by coincidence). Gains and losses may offset each other over a period of years, but sizable year-to-year variations from assumed experience are common. Detail on the analysis of the financial experience is shown below.

### MSEP

| | $ Millions | Valuation Date June 30 | Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities |
|---|---|---|---|
| Unfunded actuarial accrued liability (UAAL) at beginning of year | $2,935.1 | 2007 | 1.0 |
| Normal cost from last valuation | 157.5 | 2008 | 0.1 |
| Actual employer contributions | (356.5) | 2009 | (5.2) |
| Interest accrual | 226.8 | 2010 | (4.0) |
| Expected UAAL before changes | 2,962.9 | 2011 | (2.4) |
| Change from any changes in benefits, assumptions, or methods | 528.8 | 2012 | (4.7) |
| Expected UAAL after changes | 3,491.7 | 2013 | (2.8) |
| Less: Actual UAAL at end of year | 3,872.8 | 2014 | 2.1 |
| Gain (loss) | $ (381.1) | 2015 | (0.9) |
| Gain (loss) as a percent of actuarial accrued liabilities at start of year ($11,727) | (3.2)% | 2016 | (3.2) |

### Judicial Plan

| | $ Millions | Valuation Date June 30 | Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities |
|---|---|---|---|
| Unfunded actuarial accrued liability (UAAL) at beginning of year | $348.6 | 2007 | (0.6) |
| Normal cost from last valuation | 11.1 | 2008 | (3.0) |
| Actual employer contributions | (34.3) | 2009 | (1.8) |
| Interest accrual | 26.9 | 2010 | (1.1) |
| Expected UAAL before changes | 352.3 | 2011 | (0.4) |
| Change from any changes in benefits, assumptions, or methods | 52.1 | 2012 | (0.6) |
| Expected UAAL after changes | 404.4 | 2013 | (2.6) |
| Less: Actual UAAL at end of year | 404.1 | 2014 | 1.5 |
| Gain (loss) | $ 0.3 | 2015 | (1.5) |
| Gain (loss) as a percent of actuarial accrued liabilities at start of year ($483) | 0.1% | 2016 | 0.1 |

## **Comparison of Plans for General State Employees** | June 30, 2016

### MSEP • MSEP 2000 • MSEP 2011

| Benefit Provisions | MSEP |
|---|---|
| **Membership eligibility** | • Members who work in a permanent position normally requiring at least 1,040 hours of work a year. |
| **Vesting** | • 5 years |
| **Base benefit formula** | • .016 x FAP x service<br>*In the past, formula increases have been passed along to MSEP retirees.* |
| **Temporary benefit formula** | • Not available |
| **Benefit payment options** | • Life income annuity<br>• *Unreduced* joint & 50% survivor<br>• Joint & 100% survivor<br>• Life income with 60 guaranteed payments<br>• Life income with 120 guaranteed payments |
| **Cost-of-living adjustment (COLA)** | • If hired before August 28, 1997, will receive 4-5% each year until reaching the 65% cap. After COLA cap, the rate is based on 80% of the percentage increase in the CPI (0-5%).<br>• If hired on or after August 28, 1997, annual COLA will be based on 80% of the percentage increase in the CPI (0-5%). |
| **Normal retirement eligibility** | • Age 65 with 5 years of service<br>• Age 60 with 15 years of service<br>"Rule of 80"- at least age 48 with age and service equaling 80 or more<br>*Age 50 if first became eligible prior to August 28, 2003* |
| **Early retirement eligibility** | • Age 55 with 10 years of service<br>*Base benefit will be reduced ½ of 1% (.005) for each month member's age is younger than normal retirement.* |
| **Death before retirement** | • Non duty-related death *(vested members)*<br>– Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children.<br>• Duty-related death *(no minimum service requirement).*<br>– Survivor benefit to eligible spouse or children no less than 50% of average compensation. |
| **In-service COLA** | • COLA given for service beyond age 65. COLA provisions are determined by employment date. |
| **BackDROP** | • Must work at least 2 years beyond normal retirement eligibility to be eligible for BackDROP. |
| **Service purchases** | • May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost. |
| **Service transfers** | • May transfer state service to other positions covered by MOSERS under 104.800. |
| **Member contributions** | • None |

| MSEP 2000 | MSEP 2011 |
|---|---|
| • Members hired for the first time on or after July 1, 2000, but prior to January 1, 2011, in a permanent position normally requiring at least 1,040 hours of work a year.<br>• Members who left state employment prior to becoming vested and returned to work on or after July 1, 2000, in a permanent position normally requiring at least 1,040 hours of work a year. | • Members hired for the first time on or after January 1, 2011, in a permanent position normally requiring at least 1,040 hours of work a year. |
| • 5 years | • 10 years |
| • .017 x FAP x service<br>*Future formula increases, if any, will not be passed along to retirees.* | • .017 x FAP x service<br>*Future formula increases, if any, will not be passed along to retirees.* |
| • .008 x FAP x service<br>*Available to those who retire under the "Rule of 80."* | • .008 x FAP x service<br>*Available to those who retire under the "Rule of 90."* |
| • Life income annuity<br>• Joint & 50% survivor<br>• Joint & 100% survivor<br>• Life income with 120 guaranteed payments<br>• Life income with 180 guaranteed payments | • Life income annuity<br>• Joint & 50% survivor<br>• Joint & 100% survivor<br>• Life income with 120 guaranteed payments<br>• Life income with 180 guaranteed payments |
| • Based on 80% of the percentage increase in the CPI (0-5%). | • Based on 80% of the percentage increase in the CPI (0-5%). |
| • Age 62 with 5 years of service<br>"Rule of 80" — at least age 48 with age and service equaling 80 or more<br>*Age 50 if first became eligible prior to August 28, 2003*<br>*Terminated-vested members not eligible for "Rule of 80."* | • Age 67 with 10 years of service<br>• "Rule of 90" — at least age 55 with age and service equaling 90 or more<br>*Terminated-vested members not eligible for "Rule of 90."* |
| • Age 57 with 5 years of service<br>*Base benefit will be reduced ½ of 1% (.005) for each month member's age is younger than normal retirement.* | • Age 62 at the time of termination with 10 years of service<br>*Base benefit will be reduced ½ of 1% (.005) for each month member's age is younger than normal retirement.*<br>*Terminated-vested members are not eligible.* |
| • Non duty-related death *(vested members)*<br>– Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children.<br>• Duty-related death *(no minimum service requirement).*<br>– Survivor benefit to eligible spouse or children no less than 50% of average compensation. | • Non duty-related death *(vested members)*<br>– Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children.<br>• Duty-related death *(no minimum service requirement).*<br>– Survivor benefit to eligible spouse or children no less than 50% of average compensation. |
| • Not available | • Not available |
| • Must work at least 2 years beyond normal retirement eligibility to be eligible for BackDROP. | • Not available |
| • May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost. | • May purchase qualifying public sector service at full actuarial cost. |
| • May transfer service under 104.1090 from other systems with written agreements to transfer required funds. | • Not available |
| • None | • 4% of pay |

## Comparison of Plans for Legislators | June 30, 2016

### MSEP • MSEP 2000 • MSEP 2011

| Benefit Provisions | MSEP |
|---|---|
| **Membership eligibility** | • Elected to the General Assembly |
| **Vesting** | • 3 full-biennial assemblies (6 years) |
| **Base benefit formula** | • Biennial assemblies x $150<br>*In the past, formula increases have been passed along to MSEP retirees.* |
| **Temporary benefit formula** | • Not available |
| **Benefit payment options** | • Life income annuity<br>• *Unreduced* joint & 50% survivor<br>• Joint & 100% survivor<br>• Life income with 60 guaranteed payments<br>• Life income with 120 guaranteed payments |
| **Cost-of-living adjustment (COLA)** | • If sworn in before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap, the rate is based on 80% of the percentage increase in the CPI (0-5%).<br>• If sworn in on or after August 28, 1997, COLA will be based on 80% of the percentage increase in the CPI (0-5%). |
| **Normal retirement eligibility** | • Age 55 with 3 full-biennial assemblies or<br>• "Rule of 80" — at least age 48 with age and service equaling 80 or more |
| **Early retirement eligibility** | • Not available |
| **Death before retirement** | • Non duty-related death *(vested members)*<br>– Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children.<br>• Duty-related death *(no minimum service requirement)*<br>– Survivor benefit to eligible spouse or children no less than 50% of the rate of compensation. |
| **In-service COLA** | • COLA given for service beyond age 65. COLA provisions are determined by employment date. |
| **BackDROP** | • Not available |
| **Service purchases** | • May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost. |
| **Service transfers** | • May transfer state service to other positions covered by MOSERS under 104.800. |
| **Member contributions** | • None |

| MSEP 2000 | MSEP 2011 |
|---|---|
| • Elected to the General Assembly on or after July 1, 2000, but prior to January 1, 2011 | • Elected to the General Assembly on or after January 1, 2011 |
| • 3 full-biennial assemblies (6 years) | • 3 full-biennial assemblies (6 years) |
| • (Active legislator's pay ÷ 24) x service<br>*Capped at 100% of pay; future formula increases, if any, will not be passed along to retirees.* | • (Active legislator's pay ÷ 24) x service<br>*Capped at 100% of pay; future formula increases, if any, will not be passed along to retirees.* |
| • Not available | • Not available |
| • Life income annuity<br>• Joint & 50% survivor<br>• Joint & 100% survivor<br>• Life income with 120 guaranteed payments<br>• Life income with 180 guaranteed payments | • Life income annuity<br>• Joint & 50% survivor<br>• Joint & 100% survivor<br>• Life income with 120 guaranteed payments<br>• Life income with 180 guaranteed payments |
| • Benefit adjustment based on increase in pay for an active member of the general assembly. | • Benefit adjustment based on increase in pay for an active member of the general assembly. |
| • Age 55 with 3 full-biennial assemblies or<br>• "Rule of 80" — at least age 50 with age and service equaling 80 or more<br>*Terminated-vested members not eligible for "Rule of 80."* | • Age 62 at time of termination with 3 full-biennial assemblies or<br>• "Rule of 90" — at least age 55 with age and service equaling 90 or more<br>*Terminated-vested members not eligible for "Rule of 90."* |
| • Not available | • Not available |
| • Non duty-related death *(vested members)*<br>– Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children.<br>• Duty-related death *(no minimum service requirement)*<br>– Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. | • Non duty-related death *(vested members)*<br>– Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children.<br>• Duty-related death *(no minimum service requirement)*<br>– Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. |
| • Not available | • Not available |
| • Not available | • Not available |
| • May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost. | • May purchase qualifying public sector service at full actuarial cost. |
| • May transfer service under 104.1090 from other systems with written agreements to transfer required funds. | • Not available |
| • None | • 4% of pay |

## Comparison of Plans for Statewide Elected Officials | June 30, 2016

### MSEP • MSEP 2000 • MSEP 2011

| Benefit Provisions | MSEP |
|---|---|
| **Membership eligibility** | • Elected to state office |
| **Vesting** | • 4 years (1 term) |
| **Base benefit formula** | • Less than 12 years of service<br>FAP x .016 x service<br>• 12 or more years of service<br>Monthly statutory compensation x .50<br>*In the past, formula increases have been passed along to MSEP retirees.* |
| **Temporary benefit formula** | • Not available |
| **Benefit payment options** | • Life income annuity<br>• *Unreduced* joint & 50% survivor<br>• Joint & 100% survivor<br>• Life income with 60 guaranteed payments<br>• Life income with 120 guaranteed payments |
| **Cost-of-living adjustment (COLA)** | • Less than 12 years of service<br>– Statewide elected officials sworn in before August 28, 1997 will receive 4-5% each year until they reach 65% cap. After COLA cap, the rate is based on 80% of the percentage increase in the CPI (0-5%).<br>– Statewide elected officials sworn in between August 28, 1997 and June 30, 2000, will receive a COLA equal to 80% of percentage increase in the CPI (0-5%).<br>• 12 or more years of service<br>– Statewide elected officials with 12 or more years of service will receive a COLA based on increases in statutory compensation for the highest position held.<br>– Statewide elected officials sworn in before August 28, 1997 will receive 4-5% each year until they reach 65% cap. After COLA cap, the rate is based on 80% of the percentage increase in the CPI (0-5%).<br>– Statewide elected officials sworn in between August 28, 1997 and June 30, 2000, will receive a COLA equal to 80% of percentage increase in the CPI (0-5%). |
| **Normal retirement eligibility** | • Age 60 with 15 years of service or<br>• "Rule of 80" — at least age 50 with age and service equaling 80 or more |
| **Early retirement eligibility** | • Age 55 with 10 years of service |
| **Death before retirement** | • Non duty-related death *(vested members)*<br>– Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children.<br>• Duty-related death *(no minimum service requirement)*<br>– Survivor benefit to eligible spouse or children no less than 50% of current pay. |
| **In-service COLA** | • COLA provisions determined by amount of service relative to 12 years and date of employment. |
| **BackDROP** | • Not available |
| **Service purchases** | • May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost. |
| **Service transfers** | • May transfer state service to other positions covered by MOSERS under 104.800. |
| **Member contributions** | • None |

| MSEP 2000 | MSEP 2011 |
|---|---|
| • First elected on or after July 1, 2000, but prior to January 1, 2011 | • First elected on or after January 1, 2011 |
| • 4 years (1 term) | • 4 years (1 term) |
| • (Active elected official's pay ÷ 24) x service<br>*Capped at 12 years of service or 50% of pay; future formula increases, if any, will not be passed along to retirees.* | • (Active elected official's pay ÷ 24) x service<br>*Capped at 12 years of service or 50% of pay; future formula increases, if any, will not be passed along to retirees.* |
| • Not available | • Not available |
| • Life income annuity<br>• Joint & 50% survivor<br>• Joint & 100% survivor<br>• Life income with 120 guaranteed payments<br>• Life income with 180 guaranteed payments | • Life income annuity<br>• Joint & 50% survivor<br>• Joint & 100% survivor<br>• Life income with 120 guaranteed payments<br>• Life income with 180 guaranteed payments |
| • Benefit adjustment based on increase in pay for an active statewide elected official. | • Benefit adjustment based on increase in pay for an active statewide elected official. |
| • Age 55 with 4 years of service or<br>• "Rule of 80" - at least age 50 with age and service equaling 80 or more<br>*Terminated-vested members not eligible for "Rule of 80."* | • Age 62 at time of termination with 4 years of service or<br>• "Rule of 90" - at least age 55 with age and service equaling 90 or more<br>*Terminated-vested members not eligible for "Rule of 90."* |
| • Not available | • Not available |
| • Non duty-related death *(vested members)*<br>– Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children.<br>• Duty-related death *(no minimum service requirement)*<br>– Survivor benefit to eligible spouse or children no less than 50% of current pay. | • Non duty-related death *(vested members)*<br>– Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children.<br>• Duty-related death *(no minimum service requirement)*<br>– Survivor benefit to eligible spouse or children no less than 50% of current pay. |
| • Not available | • Not available |
| • Not available | • Not available |
| • May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase qualifying public sector service at full actuarial cost. | • May purchase qualifying public sector service at full actuarial cost. |
| • May transfer service under 104.1090 from other systems with written agreements to transfer required funds. | • Not available |
| • None | • 4% of pay |

## Comparison of Plans for Judges | June 30, 2016

### Judicial Plan • Judicial Plan 2011

| Benefit Provisions | Judicial Plan |
|---|---|
| Membership eligibility | • Must be a judge or commissioner of the supreme court or the court of appeals, a judge of the circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections, a justice of the peace, or a commissioner or deputy commissioner of the circuit court appointed after February 29, 1972; a commissioner of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo; a commissioner of the drug court pursuant to Section 478.466, RSMo; or a commissioner of the family court. |
| Vesting | • Immediate |
| Base benefit formula | • Monthly pay x .50 = monthly base benefit |
| Temporary benefit formula | • Not available |
| Benefit payment options | • Life income annuity<br>• Automatic *unreduced* joint and 50% survivor option<br>*If married at least two continuous years immediately preceding judges death.* |
| Cost-of-living adjustment (COLA) | • If hired before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap, the rate is based on 80% of the percentage increase in the CPI (0-5%)<br>• If hired on or after August 28, 1997, based on 80% of the percentage increase in the CPI (0-5%). |
| Normal retirement eligibility | • Age 62 with 12 years service<br>• Age 60 with 15 years service<br>• Age 55 with 20 years service |
| Reduced retirement eligibility | • Age 60 if less than 15 years service<br>• Age 62 if less than 12 years service |
| Death before retirement | • Non duty-related death<br>– Survivor benefit to eligible spouse equal to 50% of the benefit the member would have received based on service to age 70. |
| In-service COLA | • Judges who are at least age 60 and work beyond the date first eligible for unreduced benefits will receive COLAs for each year worked beyond normal retirement eligibility. COLA provisions are determined by date of employment. |
| BackDROP | • Not available |
| Service purchases | • May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost. |
| Service transfers | • May transfer state service to other positions covered by MOSERS under 104.800. |
| Member contributions | • None |

**Judicial Plan 2011**

- Must be a judge or commissioner of the supreme court or the court of appeals, a judge of the circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections, a justice of the peace, or a commissioner or deputy commissioner of the circuit court; a commissioner of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo; a commissioner of the drug court pursuant to Section 478.466, RSMo; or a commissioner of the family court appointed or elected a judge for the first time on or after January 1, 2011.

- Immediate
- Monthly pay x .50 = monthly base benefit
- Not available
- Life income annuity
- Joint & 50% survivor
- Joint & 100% survivor
- Life income with 120 guaranteed payments
- Life income with 180 guaranteed payments
- Based on 80% of the percentage increase in the CPI (0-5%)
- Age 67 with 12 years service
- Age 62 with 20 years service
- Age 67 if less than 12 years service
- Age 62 if less than 20 years service
- Non duty-related death
  - Survivor benefit to eligible spouse equal to 50% of the benefit the member would have received based on service to age 70.
- Not available
- Not available
- May purchase qualifying public sector service at full actuarial cost.
- May transfer state service to other positions covered by MOSERS under 104.800.
- 4% of pay

## Comparison of Plans for Uniformed Members of the Water Patrol | June 30, 2016

### MSEP • MSEP 2000

| Benefit Provisions | MSEP | MSEP 2000 |
|---|---|---|
| **Membership eligibility** | • Members who work in a permanent position normally requiring at least 1,040 hours of work a year. | • Members hired for the first time on or after July 1, 2000, in a permanent position normally requiring at least 1,040 hours of work a year.<br>• Members who left state employment prior to becoming vested and returned to work on or after July 1, 2000, in a permanent position normally requiring at least 1,040 hours of work a year. |
| **Vesting** | • 5 years of service | • 5 years of service |
| **Base benefit formula** | • 1.6% x FAP x service increased by 33.3% | • 1.7% x FAP x service |
| **Temporary benefit formula** | • Not available | • 0.8% x FAP x service<br>*(must retire under "Rule of 80")* |
| **Benefit payment options** | • Life income annuity<br>• *Unreduced* joint and 50% survivor<br>• Joint & 100% survivor<br>• 60 or 120 guaranteed payments | • Life income annuity<br>• Joint & 50% survivor<br>• Joint & 100% survivor<br>• 120 or 180 guaranteed payments |
| **Cost-of-living adjustment (COLA)** | • If hired before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap, the rate is based on 80% of the percentage increase in the CPI (0-5%).<br>• If hired on or after August 28, 1997, based on 80% of the percentage increase in the CPI (0-5%). | • Based on 80% of the percentage increase in the CPI (0-5%). |
| **Normal retirement eligibility** | • Age 55 with 5 years of service<br>• "Rule of 80"- minimum age 48 | • Age 62 with 5 years of service<br>• "Rule of 80" - minimum age 48 |
| **Early retirement eligibility** | • Not available | • Age 57 with 10 years of service |
| **Death before retirement** | • Non duty-related death *(vested members)*<br>– Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children.<br>• Duty-related death<br>*(no minimum service requirement)*<br>– Survivor benefit to eligible spouse or children no less than 50% of current pay. | • Non duty-related death *(vested members)*<br>– Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children.<br>• Duty-related death<br>*(no minimum service requirement)*<br>– Survivor benefit to eligible spouse or children no less than 50% of current pay. |
| **In-service COLA** | • COLA given for service beyond age 65. COLA provisions are determined by employment date. | • Not available |
| **BackDROP** | • Must work at least two years beyond normal retirement eligibility to be eligible for BackDROP. | • Must work at least two years beyond normal retirement eligibility to be eligible for BackDROP. |
| **Service purchases** | • May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost. | • May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost. |
| **Service transfers** | • May transfer state service to other positions covered by MOSERS under 104.800. | • May transfer state service to other positions covered by MOSERS under 104.1090. |
| **Member contributions** | • None | • None |

*SUMMARY OF PLAN PROVISIONS*

## **Life Insurance Plans** | June 30, 2016

MOSERS administers basic and optional term life insurance plans for eligible state employees and retirees.

### Active Members*

| Plan Provision | Requirement |
|---|---|
| • **Basic life insurance** - An amount equal to one times annual salary (with a minimum of $15,000) while actively employed. | • Actively employed in an eligible state position resulting in membership in MOSERS. |
| • **Duty-related death benefit** - Duty-related death benefit equivalent to two times the annual salary the member was earning at the time of death in addition to the basic life insurance amount of one times annual salary. | • Actively employed in an eligible state position resulting in membership in MOSERS. |
| • **Optional life insurance** - Additional life insurance may be purchased in a flat amount in multiples of $10,000 not to exceed the maximum (lesser of six times annual salary or $800,000). Spouse coverage may be purchased in multiples of $10,000 up to a maximum of $100,000; however, the amount of spouse coverage cannot exceed the amount of optional life insurance coverage the member has purchased. Coverage for children is available in a flat amount of $10,000 per child. | • Actively employed in an eligible state position resulting in membership in MOSERS. |

* *Terminating employees may convert coverage up to the amount they had as an active employee at individual rates.*

### Retired Members

| Plan Provision | Requirement |
|---|---|
| • **Basic life insurance at retirement** - $5,000 basic life insurance during retirement. | • Must retire directly from active employment. |
| • **Optional life insurance at retirement** (**MSEP**) - An employee may retain up to the lesser of $60,000 or the amount of optional life insurance coverage held at the time of retirement at the group rate and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member's retirement and may be converted at individual rates. | • Must retire directly from active employment. |
| • **Optional life insurance at retirement** (**MSEP 2000**) - Under "Rule of 80", an employee may retain the current amount of coverage prior to retirement until age 62 at which time coverage is reduced to $60,000, and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member's retirement and may be converted at individual rates. | • Must retire directly from active employment. |
| • **Optional life insurance at retirement** (**MSEP 2011**) - Under "Rule of 90", an employee may retain the current amount of coverage prior to retirement until age 62 at which time coverage is reduced to $60,000, and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member's retirement and may be converted at individual rates. | • Must retire directly from active employment. |

*Note: Insured employees may port their life insurance and their dependent life insurance when their coverage has been reduced or terminated if they meet certain qualifications.*

## **Long-Term Disability (LTD) Insurance Plans** | June 30, 2016

MOSERS administers the LTD Plan for eligible state employees who become disabled during active employment.

### Active Members

| Classification | Requirement |
|---|---|
| **General state employees, legislators, and elected state officials** - Members of MOSERS in a position normally requiring 1,040 hours of work a year are covered under the LTD plan, unless they work for a state agency which has its own LTD plan. | • Eligible participants receive 60% of their compensation minus primary social security, workers' compensation, and employer provided income. Benefits commence after 90 days of disability or when sick leave benefits are no longer payable, whichever occurs last. LTD benefits cease upon the earliest of (i) when disability ends, (ii) when the member is first eligible for normal retirement benefits or is receiving early retirement benefits, (iii) upon a member's death, (iv) the date benefits become payable under any other group long-term disability insurance plan, or, (v) the date the member fails to provide proof of continued disability and entitlement to LTD benefits. |
| **Water patrol** | • Uniformed members who are eligible for statutory occupational disability receive benefits equal to 50% of compensation with no offset for social security at the time of disability. For nonoccupational disabilities, eligible participants receive the same benefit as general employees. |
| **Judges** | • In addition to the disability benefits provided to general employees, judges may receive benefits under the state constitution. Participants may receive 50% of salary until the current term expires. |

## Changes in Plan Provisions

During the 2016 legislative session, Senate Bill 585 was passed and signed by the Governor. This bill provides for MOSERS coverage of juvenile court positions in multi-county judicial circuits when such circuits split into single county circuits and all salary for these positions is received from the state; otherwise, there were no changes in benefit plan provisions this year.

## **Actuarial Present Values** | June 30, 2016

### MSEP

| Actuarial Present Value June 30, 2016 | Actuarial Present Value | Portion Covered by Future Normal Cost Contributions | Actuarial Accrued Liabilities |
|---|---|---|---|
| **Active members** | | | |
| Service retirement benefits based on services rendered before and likely to be rendered after valuation date | $5,058,251,210 | $ 650,835,032 | $ 4,407,416,178 |
| Disability benefits likely to be paid to present active members who become totally and permanently disabled | 167,686,558 | 103,681,884 | 64,004,674 |
| Survivor benefits likely to be paid to widows and children of present active members who die before retiring | 58,052,028 | 14,107,063 | 43,944,965 |
| Separation benefits likely to be paid to present active members | 396,014,751 | 181,973,237 | 214,041,514 |
| Refunds likely to be paid to present active members | 54,369,551 | 52,593,418 | 1,776,133 |
| **Active member totals** | $5,734,374,098 | $1,003,190,634 | 4,731,183,464 |
| **Members on leave of absence & LTD** | | | |
| Service retirement benefits based on service rendered before the valuation date | | | 121,521,161 |
| **Terminated-vested members** | | | |
| Service retirement benefits based on service rendered before the valuation date | | | 592,562,844 |
| **Retired lives** | | | 7,293,973,373 |
| **Pending refunds** | | | 11,405,729 |
| **BackDROP installment payments incurred, but not yet paid** | | | 516,182 |
| **Total actuarial accrued liability** | | | 12,751,162,753 |
| **Less: actuarial value of assets** | | | 8,878,057,191 |
| **Unfunded actuarial accrued liability** | | | $ 3,873,105,562 |
| **Funded ratio** | | | 69.6% |

## **Actuarial Present Values** | June 30, 2016

### Judicial Plan

| Actuarial Present Value June 30, 2016 | Actuarial Present Value | Portion Covered by Future Normal Cost Contributions | Actuarial Accrued Liabilities |
|---|---|---|---|
| **Active members** | | | |
| Service retirement benefits based on services rendered before and likely to be rendered after valuation date | $246,664,413 | $64,303,520 | $182,360,893 |
| Disability benefits likely to be paid to present active members who become totally and permanently disabled | 1,446,086 | 1,488,681 | (42,595) |
| Survivor benefits likely to be paid to widows and children of present active members who die before retiring | 4,555,333 | 2,671,030 | 1,884,303 |
| Separation benefits likely to be paid to present active members | 8,584,028 | 8,387,082 | 196,946 |
| Refunds likely to be paid to present active members | 48,682 | 43,749 | 4,933 |
| **Active member totals** | $261,298,542 | $76,894,062 | 184,404,480 |
| **Retired lives** | | | 354,715,048 |
| **Terminated-vested members** | | | 7,897,327 |
| **Member on leave of absence** | | | 0 |
| **Members on LTD** | | | 604,762 |
| **Total actuarial accrued liability** | | | 547,621,617 |
| **Less: actuarial value of assets** | | | 143,468,860 |
| **Unfunded actuarial accrued liability** | | | $404,152,757 |
| **Funded ratio** | | | 26.2% |

"Initially, when deciding how much to contribute to deferred comp, I simply invested the minimum required to get the allocated employer match. Thereafter, my contributions varied. Sometimes I redirected COLAs and promotional salary increases into deferred comp. Other times my contributions were based on money available after paying off a debt. While there were times when I suspended or reduced deferrals, my overall focus was on increasing and maintaining my contributions.

Without saving for retirement I couldn't have retired early. In fact, I would still be working. Now retired for almost 5½ years, I love living life as a retiree! The freedom of a well-planned retirement life is hard to describe, it's sort of like fine chocolate — once you've had a taste of it, you want more and won't want to give it up!"

– *Jacque*

*MOSERS' Retiree*

*"Without saving for retirement I couldn't have retired early. In fact, I would still be working. Now retired for almost 5½ years, I love living life as a retiree!"*

## Statistical Section

## Summary

### Plan Membership

Membership in the pension trusts administered by MOSERS increased by 1,571. Active members decreased by 513, retired members and their beneficiaries increased by 1,865, and terminated-vested members increased by 219. Membership data for the last ten years ended June 30, 2016, can be found on page 134. The location of benefit recipients, showing that the majority remain in the state of Missouri after retirement, is depicted on page 135.

### Valuation Assets vs Pension Liabilities

The charts on 130-132 graphically represent the funding progress of the pension plans for the 10 years ended June 30, 2016. The bar charts in the middle of the pages show the portion of the pension liabilities that are unfunded compared to the portion covered by assets in the trust funds. The bar charts on the bottom of the pages illustrate the funded ratio of the plans for the ten years ended June 30, 2016.

The existence of the unfunded actuarial accrued liabilities is not necessarily an indication of financial problems, but the fluctuations are important and must be monitored and controlled.

The remainder of this section contains various statistical and historical data considered useful in evaluating the condition of the plans.

All nonaccounting data is taken from MOSERS' internal sources except for that information which is derived from the actuarial valuations (pages 130-134, 138, and 148-149). Member data may differ between some schedules since the valuations are performed using data as of May 31 each year.

## Changes in Net Position | Last Ten Fiscal Years

| | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|
| **MSEP** | | | | |
| *Additions* | | | | |
| Employer contributions | $ 239,488,751 | $ 249,770,156 | $ 252,105,008 | $ 251,226,187 |
| Employee contributions | 0 | 0 | 0 | 0 |
| Member service purchases | 3,460,923 | 3,085,133 | 3,235,999 | 3,576,954 |
| Service transfers in | 172,936 | 38,069 | 28,075 | 10,009 |
| Investment income (net of expenses) | 1,283,573,438 | 110,627,355 | (1,508,376,715) | 859,898,512 |
| Other | 542,266 | 572,274 | 619,060 | 639,901 |
| Total additions to plan net position | 1,527,238,314 | 364,092,987 | (1,252,388,573) | 1,115,351,563 |
| *Deductions* | | | | |
| Benefits | 447,240,771 | 479,853,891 | 511,466,555 | 543,284,289 |
| Refunds | 0 | 0 | 0 | 3,106 |
| Service transfers out | 51,980 | 251,443 | 0 | 462,970 |
| Administrative expenses | 6,689,710 | 6,950,878 | 7,088,483 | 7,064,544 |
| Total deductions from plan net position | 453,982,461 | 487,056,212 | 518,555,038 | 550,814,909 |
| **Change in net position** | $1,073,255,853 | $(122,963,225) | $(1,770,943,611) | $ 564,536,654 |
| | | | | |
| **Judicial Plan** | | | | |
| *Additions* | | | | |
| Employer contributions | $23,745,467 | $26,215,309 | $27,725,882 | $27,029,198 |
| Employee contributions | 0 | 0 | 0 | 0 |
| Investment income (net of expenses) | 11,356,312 | 1,043,940 | (15,847,382) | 9,909,718 |
| Other | 4,798 | 5,506 | 6,504 | 7,374 |
| Total additions to plan net position | 35,106,577 | 27,264,755 | 11,885,004 | 36,946,290 |
| *Deductions* | | | | |
| Benefits | 20,595,504 | 22,058,085 | 23,232,088 | 24,230,545 |
| Refunds | | | | |
| Administrative expenses | 59,187 | 66,880 | 74,473 | 81,414 |
| Total deductions from plan net position | 20,654,691 | 22,124,965 | 23,306,561 | 24,311,959 |
| **Change in net position** | $ 14,451,886 | $ 5,139,790 | $ (11,421,557) | $ 12,634,331 |
| | | | | |
| **Internal Service Fund** | | | | |
| *Operating revenues* | | | | |
| Premium receipts | $ 27,101,931 | $ 27,957,666 | $28,990,057 | $ 29,098,799 |
| Deferred compensation receipts | 0 | 60,393,973 | 75,661,047 | 69,143,267 |
| Miscellaneous income | 436,502 | 536,493 | 1,027,380 | 1,039,369 |
| Total operating revenues | 27,538,433 | 88,888,132 | 105,678,484 | 99,281,435 |
| *Operating expenses* | | | | |
| Premium disbursements | 27,063,815 | 27,927,265 | 28,968,981 | 29,077,825 |
| Deferred compensation disbursements | 0 | 60,371,802 | 75,683,218 | 69,143,267 |
| Premium refunds | 38,116 | 30,401 | 21,076 | 20,974 |
| Administrative expenses | 527,040 | 708,100 | 819,581 | 797,020 |
| Total operating expenses | 27,628,971 | 89,037,568 | 105,492,856 | 99,039,086 |
| *Non-operating revenues* | | | | |
| Investment income | 117,729 | 77,396 | 20,755 | 9,816 |
| **Change in net position** | $ 27,191 | $ (72,040) | $ 206,383 | $ 252,165 |

| 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| $ 263,418,048 | $ 263,373,924 | $ 274,655,284 | $ 326,370,336 | $ 329,752,832 | $ 329,957,369 |
| 599,761 | 4,955,399 | 9,698,883 | 14,025,328 | 18,099,455 | 21,684,920 |
| 2,814,551 | 2,869,085 | 3,475,123 | 2,909,423 | 1,859,005 | 2,815,749 |
| 142,248 | 2,675,339 | 2,446,627 | 2,252,206 | 3,575,815 | 2,107,873 |
| 1,395,677,299 | 158,102,123 | 778,008,348 | 1,484,709,539 | (237,603,530) | 1,194,422 |
| 659,474 | 448,463 | 489,193 | 450,453 | 533,001 | 545,847 |
| 1,663,311,381 | 432,424,333 | 1,068,773,458 | 1,830,717,285 | 116,216,578 | 358,306,180 |
| 597,424,954 | 611,522,451 | 646,708,308 | 677,097,411 | 723,994,041 | 750,440,412 |
| 0 | 123,709 | 622,341 | 1,421,856 | 2,479,264 | 3,798,199 |
| 17,745,828 | 588,180 | 1,911,665 | 1,916,840 | 1,792,495 | 3,071,892 |
| 7,054,581 | 7,017,057 | 7,575,883 | 7,336,922 | 8,077,692 | 8,489,375 |
| 622,225,363 | 619,251,397 | 656,818,197 | 687,773,029 | 736,343,492 | 765,799,878 |
| $1,041,086,018 | $(186,827,064) | $ 411,955,261 | $1,142,944,256 | $(620,126,914) | $(407,493,698) |
| $ 27,702,682 | $ 26,324,526 | $ 28,330,649 | $ 29,264,877 | $ 32,696,686 | $ 33,642,498 |
| 59,958 | 149,859 | 211,936 | 294,810 | 488,193 | 661,206 |
| 17,460,050 | 2,061,916 | 10,724,252 | 21,388,261 | (3,618,469) | 19,273 |
| 8,250 | 5,849 | 6,743 | 6,489 | 8,117 | 8,808 |
| 45,230,940 | 28,542,150 | 39,273,580 | 50,954,437 | 29,574,527 | 34,331,785 |
| 25,488,531 | 26,821,412 | 27,802,871 | 29,406,625 | 31,245,906 | 32,979,706 |
| | | | | | 10,008 |
| 88,253 | 91,514 | 104,428 | 105,693 | 123,015 | 136,983 |
| 25,576,784 | 26,912,926 | 27,907,299 | 29,512,318 | 31,368,921 | 33,126,697 |
| $ 19,654,156 | $ 1,629,224 | $ 11,366,281 | $ 21,442,119 | $ (1,794,394) | $ 1,205,088 |
| $ 28,829,638 | $ 28,578,326 | $ 28,961,637 | $ 29,563,054 | $ 30,177,918 | $ 30,360,162 |
| 54,221,226 | 17,500,476 | 0 | 1,000,000 | 0 | 0 |
| 981,404 | 608,187 | 480,120 | 480,120 | 480,120 | 480,120 |
| 84,032,268 | 46,686,989 | 29,441,757 | 31,043,174 | 30,658,038 | 30,840,282 |
| 28,804,638 | 28,556,036 | 28,930,950 | 29,544,110 | 30,157,271 | 30,328,802 |
| 54,221,226 | 17,500,476 | 0 | 0 | 0 | 0 |
| 24,999 | 22,291 | 30,687 | 18,942 | 20,646 | 31,360 |
| 826,809 | 778,529 | 805,457 | 755,945 | 960,827 | 1,015,578 |
| 83,877,672 | 46,857,332 | 29,767,094 | 30,318,997 | 31,138,744 | 31,375,740 |
| 11,071 | 11,068 | 12,075 | 11,886 | 12,549 | 18,777 |
| $ 165,667 | $ (159,275) | $ (313,262) | $ 736,063 | $ (468,157) | $ (516,681) |

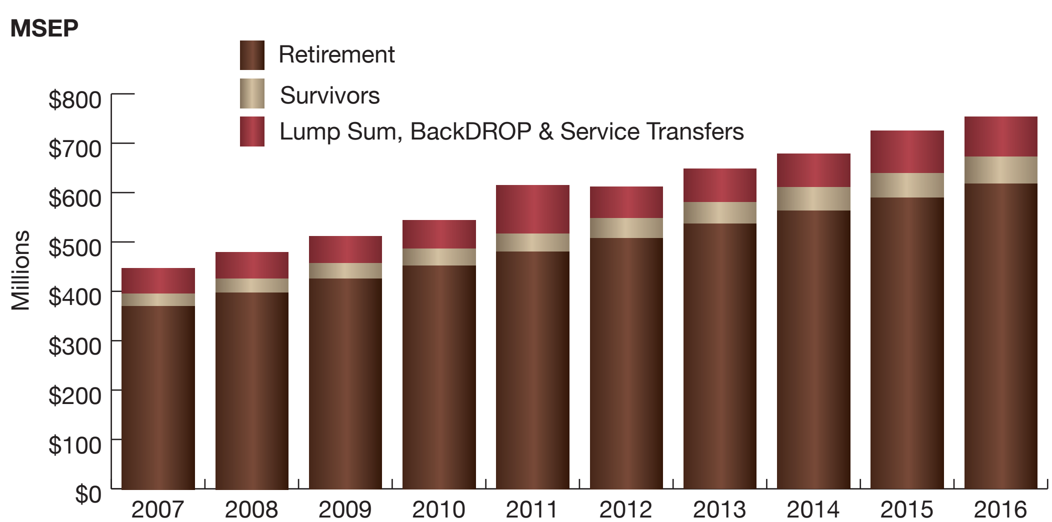
## Deductions from Net Position for Benefits and Refunds by Type | Last Ten Fiscal Years

### MSEP

| Type of benefit | FY07 | FY08 | FY09 | FY10 |
|---|---|---|---|---|
| Retirement | $366,185,990 | $393,328,057 | $421,847,017 | $448,880,110 |
| Survivors | 29,340,464 | 31,894,702 | 34,615,979 | 37,718,898 |
| Disability | 42,273 | 36,825 | 33,812 | 33,403 |
| Lump sum | 556,568 | 454,643 | 272,189 | 409,787 |
| BackDROP and service transfers | 51,115,476 | 54,139,664 | 54,697,557 | 56,705,060 |
| Total benefits | $447,240,771 | $479,853,891 | $511,466,554 | $543,747,258 |
| Refunds | $ 0 | $ 0 | $ 0 | $ 3,106 |

### Judicial Plan

| Type of benefit | FY07 | FY08 | FY09 | FY10 |
|---|---|---|---|---|
| Retirement | $17,135,426 | $18,342,676 | $19,143,753 | $19,784,720 |
| Survivors | 3,433,078 | 3,715,409 | 4,088,335 | 4,445,825 |
| Disability | 27,000 | 0 | 0 | 0 |
| Total benefits | $20,595,504 | $22,058,085 | $23,232,088 | $24,230,545 |
| Refunds | $ 0 | $ 0 | $ 0 | $ 0 |

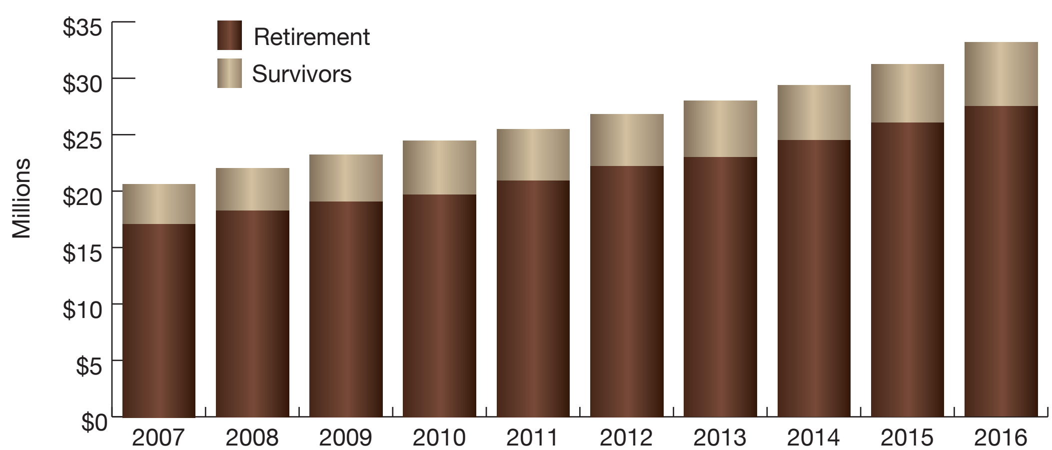



Disability benefits are included, but amounts are too minimal to display visually in graph.

| FY11 | FY12 | FY13 | FY14 | FY15 | FY16 |
|---|---|---|---|---|---|
| $476,841,741 | $504,555,055 | $533,962,630 | $560,553,490 | $586,597,187 | $615,708,229 |
| 39,968,601 | 42,963,959 | 46,659,381 | 49,922,170 | 52,940,062 | 56,495,787 |
| 29,191 | 29,503 | 27,255 | 22,468 | 16,857 | 15,470 |
| 293,147 | 229,650 | 191,320 | 286,184 | 57,525 | 267,198 |
| 98,038,103 | 64,332,464 | 67,779,388 | 68,229,937 | 86,174,905 | 81,025,620 |
| $615,170,783 | $612,110,631 | $648,619,974 | $679,014,249 | $725,786,536 | $753,512,304 |
| $ 0 | $ 123,709 | $ 622,341 | $ 1,421,856 | $ 2,479,264 | $ 3,798,199 |

| FY11 | FY12 | FY13 | FY14 | FY15 | FY16 |
|---|---|---|---|---|---|
| $21,025,904 | $22,284,844 | $23,123,707 | $24,609,421 | $26,181,505 | $27,641,108 |
| 4,462,627 | 4,536,569 | 4,679,169 | 4,797,204 | 5,064,400 | 5,338,598 |
| 0 | 0 | 0 | 0 | 0 | 0 |
| $25,488,531 | $26,821,413 | $27,802,876 | $29,406,625 | $31,245,905 | $32,979,706 |
| $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 10,008 |

**Judicial Plan**




Disability benefits are included, but amounts are too minimal to display visually in graph.

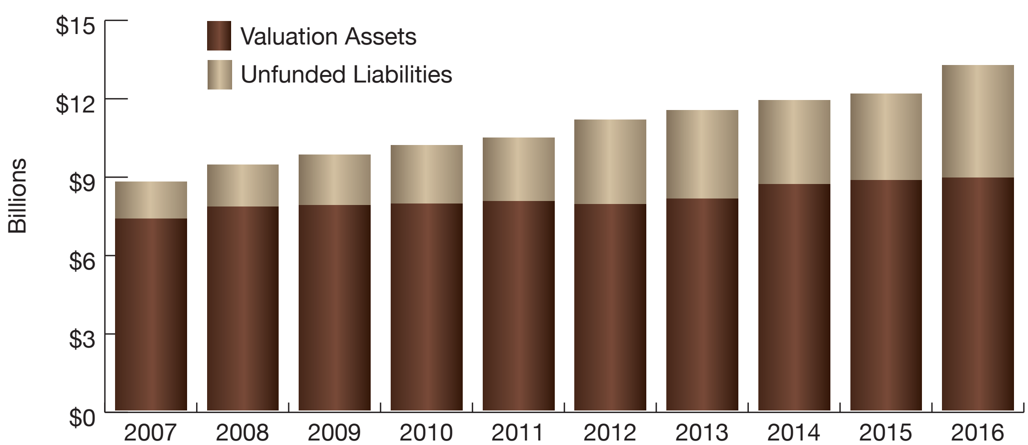
*Pension Trust Funds*

## **Valuation Assets (Smoothed Market) vs. Pension Liabilities** | Ten Years Ended June 30, 2016

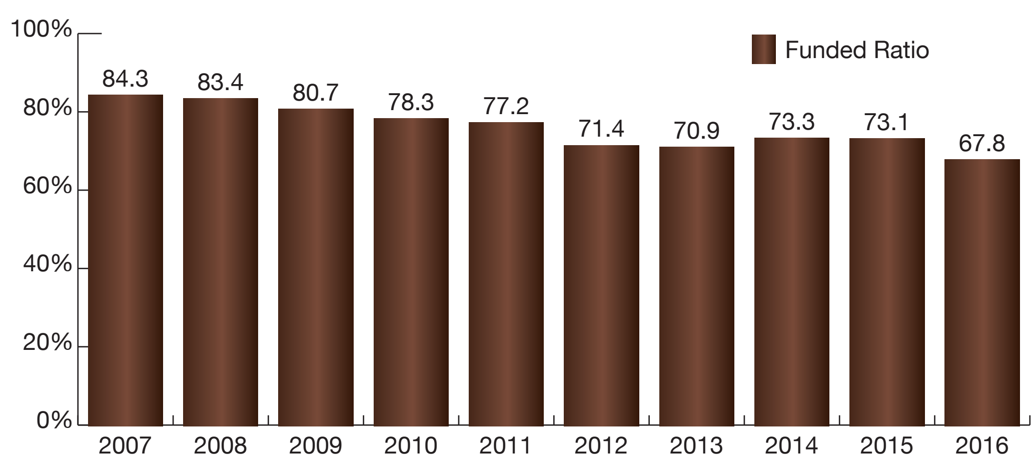
### All Plans Combined

| | Dollars in Billions | | | |
|---|---|---|---|---|
| Fiscal Year | Valuation Assets | Unfunded Liabilities | Accrued Liabilities | Funded Ratios |
| 2007 | $7.4392 | $1.3879 | $ 8.8271 | 84.3% |
| 2008 | 7.9117 | 1.5714 | 9.4831 | 83.4 |
| 2009 | 7.9574 | 1.9065 | 9.8639 | 80.7 |
| 2010 | 8.0123 | 2.2228 | 10.2352 | 78.3 |
| 2011 | 8.1210 | 2.3960 | 10.5170 | 77.2 |
| 2012 | 7.9994 | 3.2076 | 11.2070 | 71.4 |
| 2013 | 8.2075 | 3.3624 | 11.5700 | 70.9 |
| 2014 | 8.7621 | 3.1949 | 11.9569 | 73.3 |
| 2015 | 8.9268 | 3.2838 | 12.2106 | 73.1 |
| 2016 | 9.0216 | 4.2772 | 13.2988 | 67.8 |

**Actuarial Accrued Liabilitites** | All Plans Combined




**Valuation Assets as Percents of Pension Liabilities** | All Plans Combined



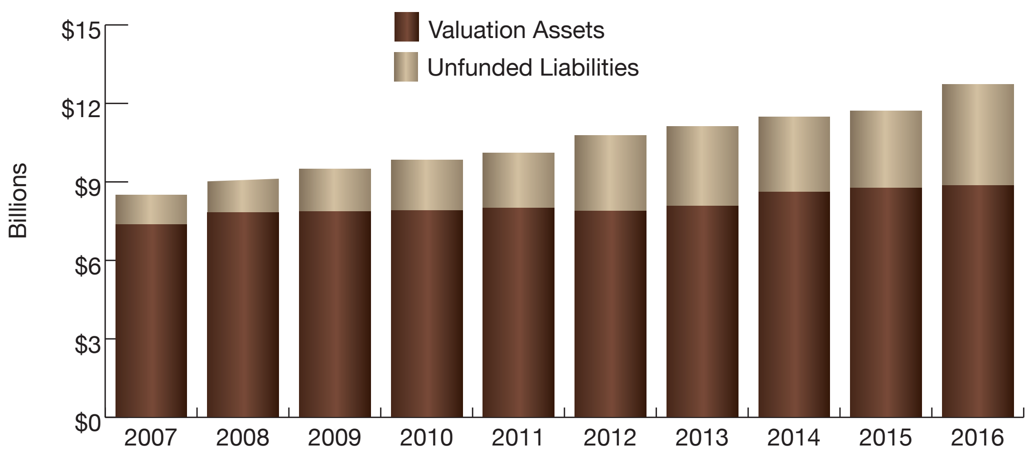
*Pension Trust Funds*

## **Valuation Assets (Smoothed Market) vs. Pension Liabilities** | Ten Years Ended June 30, 2016

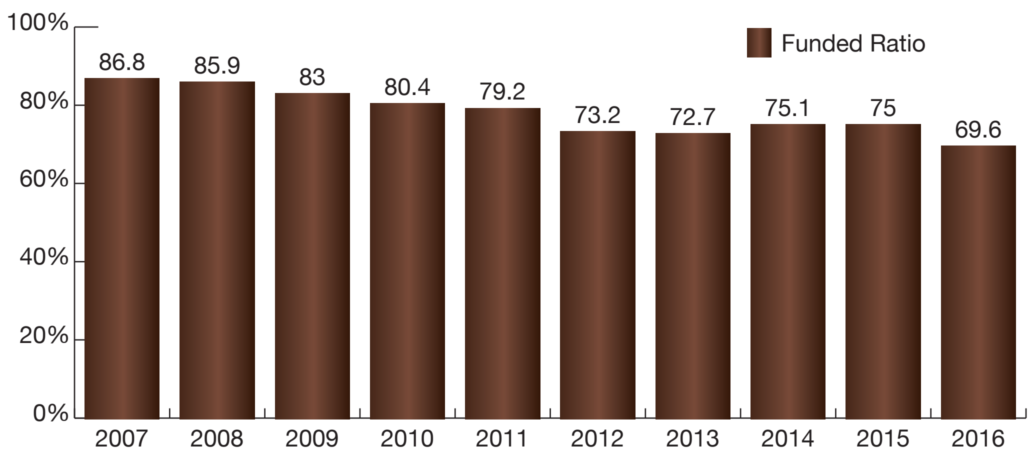
### MSEP

| | Dollars in Billions | | | |
|---|---|---|---|---|
| Fiscal Year | Valuation Assets | Unfunded Liabilities | Accrued Liabilities | Funded Ratios |
| 2007 | $7.3773 | $1.1231 | $ 8.5004 | 86.8% |
| 2008 | 7.8385 | 1.2898 | 9.1283 | 85.9 |
| 2009 | 7.8761 | 1.6187 | 9.4948 | 83.0 |
| 2010 | 7.9234 | 1.9300 | 9.8532 | 80.4 |
| 2011 | 8.0225 | 2.1010 | 10.1240 | 79.2 |
| 2012 | 7.8972 | 2.8965 | 10.7937 | 73.2 |
| 2013 | 8.0964 | 3.0382 | 11.1346 | 72.7 |
| 2014 | 8.6378 | 2.8568 | 11.4946 | 75.1 |
| 2015 | 8.7925 | 2.9351 | 11.7276 | 75.0 |
| 2016 | 8.8781 | 3.8731 | 12.7512 | 69.6 |

**Actuarial Accrued Liabilitites** | MSEP




**Valuation Assets as Percents of Pension Liabilities** | MSEP



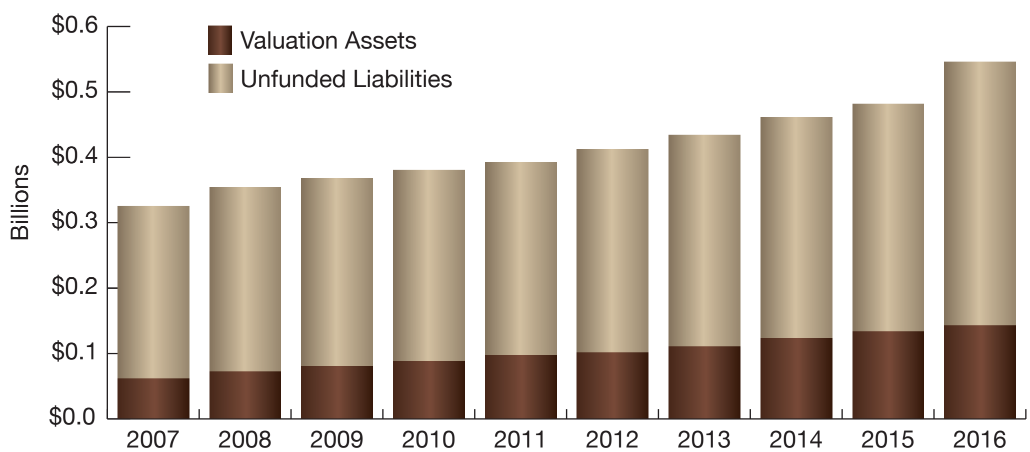
*Pension Trust Funds*

## Valuation Assets (Smoothed Market) vs. Pension Liabilities | Ten Years Ended June 30, 2016

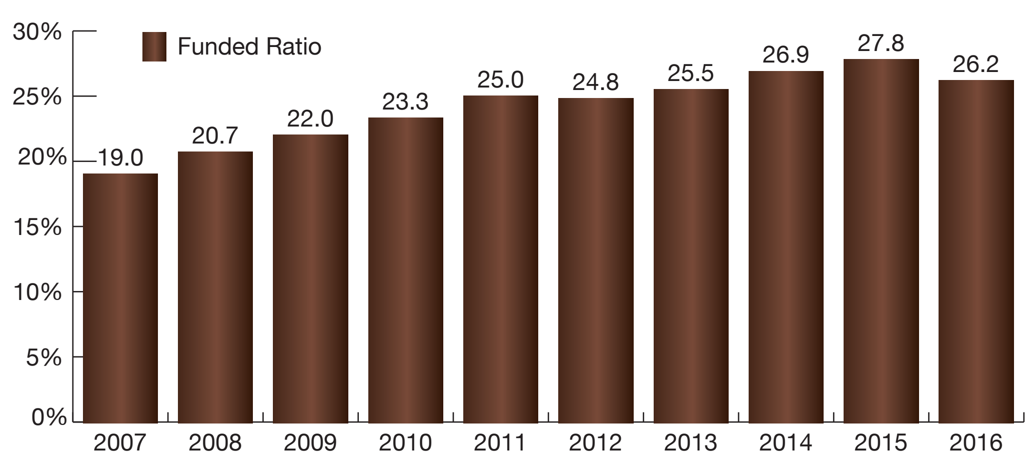
### Judicial Plan

| | Dollars in Billions | | | |
|---|---|---|---|---|
| Fiscal Year | Valuation Assets | Unfunded Liabilities | Accrued Liabilities | Funded Ratios |
| 2007 | $0.0619 | $0.2648 | $0.3267 | 19.0% |
| 2008 | 0.0732 | 0.2816 | 0.3548 | 20.7 |
| 2009 | 0.0813 | 0.2878 | 0.3691 | 22.0 |
| 2010 | 0.0890 | 0.2930 | 0.3820 | 23.3 |
| 2011 | 0.0984 | 0.2951 | 0.3935 | 25.0 |
| 2012 | 0.1023 | 0.3111 | 0.4133 | 24.8 |
| 2013 | 0.1111 | 0.3242 | 0.4354 | 25.5 |
| 2014 | 0.1243 | 0.3381 | 0.4623 | 26.9 |
| 2015 | 0.1343 | 0.3486 | 0.4830 | 27.8 |
| 2016 | 0.1435 | 0.4041 | 0.5476 | 26.2 |

**Actuarial Accrued Liabilitites** | Judicial Plan



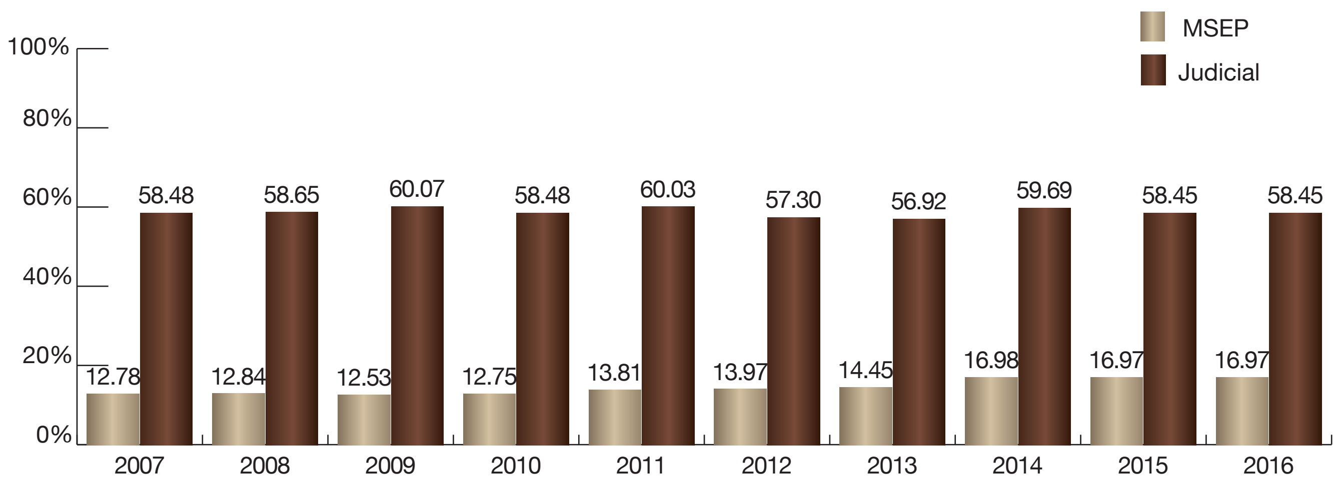

**Valuation Assets as Percents of Pension Liabilities** | Judicial Plan



## **Contribution Rates as a Percent of Payroll** | Last Ten Fiscal Years

| Fiscal Year | MSEP | Judicial Plan |
|---|---|---|
| 2007 | 12.78% | 58.48% |
| 2008 | 12.84 | 58.65 |
| 2009 | 12.53 | 60.07 |
| 2010 | 12.75 | 58.48 |
| 2011 | 13.81 | 60.03 |
| 2012 | 13.97 | 57.30 |
| 2013 | 14.45 | 56.92 |
| 2014 | 16.98 | 59.69 |
| 2015 | 16.97 | 58.45 |
| 2016 | 16.97 | 58.45 |

**Contribution Rates**

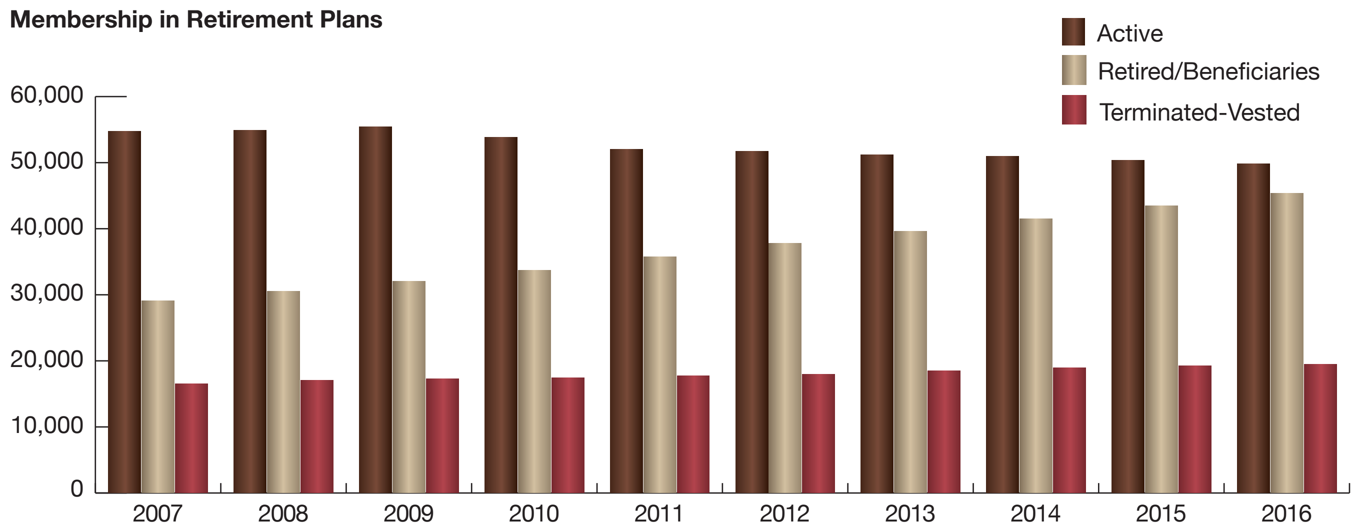


## **Membership in Retirement Plans** | Last Ten Fiscal Years

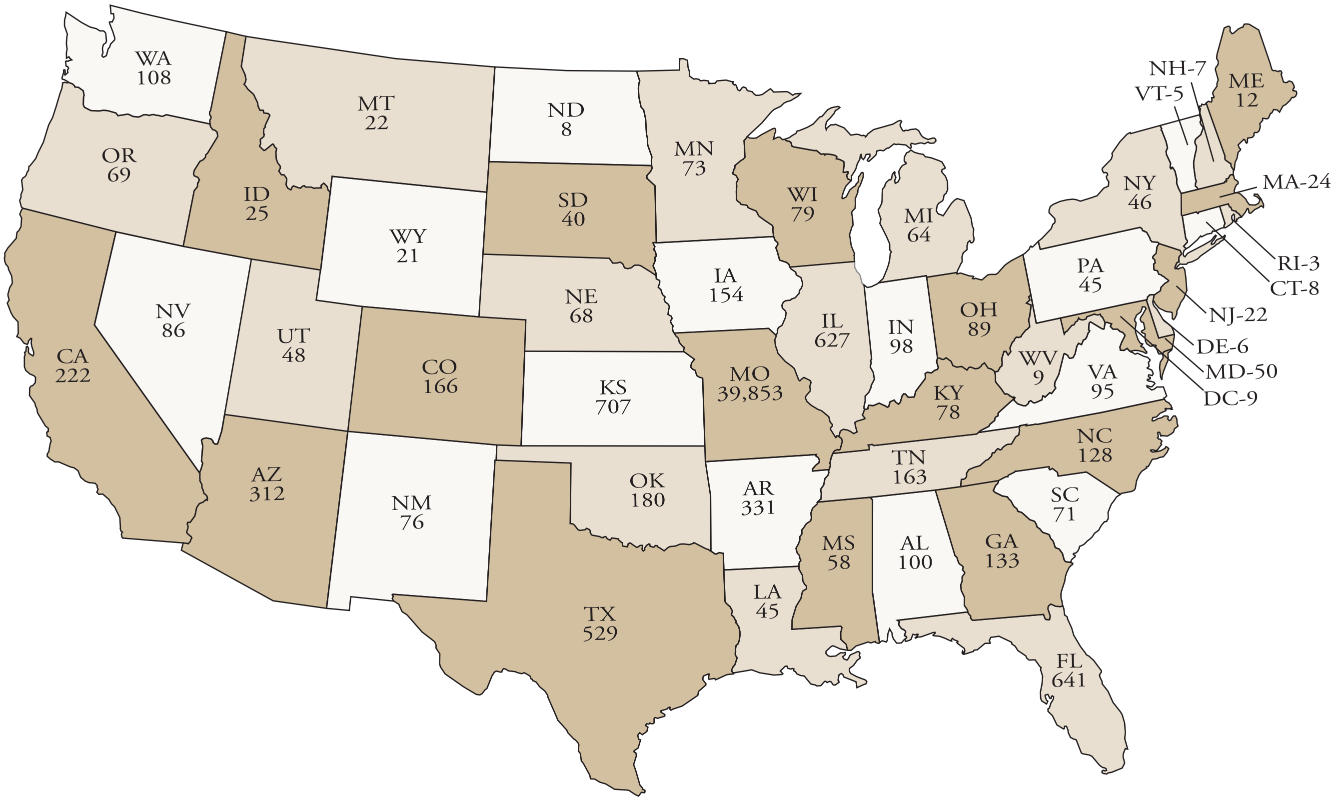
### All Plans Combined

| Fiscal Year | Active* | Retired/Beneficiaries | Terminated-Vested | Totals |
|---|---|---|---|---|
| 2007 | 54,763 | 29,129 | 16,578 | 100,470 |
| 2008 | 54,943 | 30,572 | 17,123 | 102,638 |
| 2009 | 55,454 | 32,100 | 17,304 | 104,858 |
| 2010 | 53,880 | 33,716 | 17,441 | 105,037 |
| 2011 | 52,059 | 35,801 | 17,757 | 105,617 |
| 2012 | 51,730 | 37,796 | 18,075 | 107,601 |
| 2013 | 51,233 | 39,636 | 18,581 | 109,450 |
| 2014 | 51,026 | 41,511 | 18,957 | 111,494 |
| 2015 | 50,385 | 43,503 | 19,319 | 113,207 |
| 2016 | 49,872 | 45,368 | 19,538 | 114,778 |

** Excludes members on leave of absence and long-term disability.*



## **Distribution of Benefit Recipients by Location** | June 30, 2016




### Benefit Recipients Outside the Continental United States

| | |
|---|---|
| 17 | Alaska |
| 8 | Hawaii |
| 2 | Army Post Office |
| 1 | Argentina |
| 3 | Australia |
| 14 | Canada |
| 1 | Colombia |
| 1 | Costa Rica |
| 1 | Croatia |
| 1 | Czech Republic |
| 1 | Ecuador |
| 1 | Germany |
| 1 | Guam |
| 1 | India |
| 2 | Ireland |
| 2 | Israel |
| 2 | Italy |
| 1 | Mexico |
| 1 | Marshall Islands |
| 1 | P. R. China |
| 1 | Philippines |
| 1 | Sri Lanka |
| 1 | Sweden |
| 1 | Thailand |
| 1 | The Netherlands |
| 1 | United Arab Emirates |
| 3 | United Kingdom |
| 3 | Virgin Islands |

## Benefit Recipients by Type of Retirement and Option Selected | June 30, 2016

### MSEP

| Amount of Monthly Benefit | Number of Benefit Recipients | Type of Retirement A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|
| 1-250 | 5,427 | 2,001 | 2,525 | 269 | 545 | 1 | 0 | 86 |
| 251-500 | 7,759 | 3,779 | 2,737 | 411 | 739 | 3 | 0 | 90 |
| 501-750 | 5,435 | 3,181 | 1,328 | 313 | 570 | 0 | 0 | 43 |
| 751-1000 | 4,897 | 3,653 | 598 | 207 | 409 | 0 | 0 | 30 |
| 1001-1250 | 4,259 | 3,600 | 254 | 128 | 261 | 0 | 0 | 16 |
| 1251-1500 | 3,549 | 3,123 | 125 | 90 | 203 | 0 | 0 | 8 |
| 1501-1750 | 2,948 | 2,662 | 66 | 65 | 152 | 0 | 0 | 3 |
| 1751-2000 | 2,416 | 2,221 | 47 | 41 | 104 | 0 | 0 | 3 |
| Over 2000 | 8,648 | 8,051 | 63 | 144 | 387 | 0 | 0 | 3 |
| Total | 45,338 | 32,271 | 7,743 | 1,668 | 3,370 | 4 | 0 | 282 |

### Judicial Plan

| Amount of Monthly Benefit | Number of Benefit Recipients | Type of Retirement A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|
| 1-250 | 3 | 0 | 1 | 0 | 2 | 0 | 0 | 0 |
| 251-500 | 8 | 0 | 6 | 0 | 1 | 0 | 0 | 1 |
| 501-750 | 7 | 0 | 3 | 0 | 3 | 0 | 0 | 1 |
| 751-1000 | 7 | 1 | 2 | 1 | 2 | 0 | 0 | 1 |
| 1001-1250 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 1251-1500 | 9 | 1 | 5 | 1 | 0 | 0 | 0 | 2 |
| 1501-1750 | 5 | 0 | 4 | 0 | 1 | 0 | 0 | 0 |
| 1751-2000 | 6 | 0 | 1 | 3 | 1 | 0 | 0 | 1 |
| Over 2000 | 502 | 313 | 53 | 29 | 104 | 0 | 0 | 3 |
| Total | 549 | 315 | 76 | 34 | 115 | 0 | 0 | 9 |

**Type of Retirement**
A - Normal retirement
B - Early retirement
C - Survivor of active
D - Survivor of retired
E - Disability
F - Occupational disability (Water Patrol)
G - Ex-spouse

| Option Selected | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 0 | 17 | 243 | 209 | 312 | 0 | 1,148 | 458 | 41 | 2,999 |
| 8 | 42 | 260 | 205 | 461 | 3 | 1,630 | 876 | 27 | 4,247 |
| 9 | 32 | 133 | 84 | 292 | 1 | 1,152 | 1,073 | 3 | 2,656 |
| 7 | 25 | 83 | 56 | 336 | 1 | 1,138 | 1,030 | 5 | 2,216 |
| 9 | 19 | 58 | 40 | 423 | 0 | 941 | 749 | 3 | 2,017 |
| 7 | 11 | 52 | 33 | 430 | 1 | 812 | 561 | 1 | 1,641 |
| 6 | 7 | 50 | 27 | 403 | 0 | 618 | 384 | 0 | 1,453 |
| 9 | 5 | 26 | 18 | 385 | 1 | 498 | 293 | 0 | 1,181 |
| 69 | 18 | 88 | 40 | 1,194 | 0 | 2,382 | 1,142 | 0 | 3,715 |
| 124 | 176 | 993 | 712 | 4,236 | 7 | 10,319 | 6,566 | 80 | 22,125 |

| Option Selected | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 4 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 |
| 467 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 1 | 11 |
| 502 | 0 | 0 | 0 | 25 | 0 | 1 | 0 | 1 | 20 |

**Option Selected**
1 - Automatic 50% joint & survivor
2 - 60 guaranteed payments
3 - 120 guaranteed payments
4 - 180 guaranteed payments
5 - 50% joint & survivor
6 - 75% joint & survivor
7 - 100% joint & survivor
8 - Unreduced 50% joint & survivor
9 - Automatic minor survivor
10 - No survivor option (includes pop-ups)

# Benefits Payable Tabulated by Type of Benefit and by Option | June 30, 2016

## MSEP

| Type of Benefit | Number | Annual Benefits | Average Annual Benefits |
|---|---|---|---|
| **Service retirement** | | | |
| Life annuity | 5,673 | $ 79,297,703 | $13,978 |
| 50% joint and survivor | 5,278 | 95,672,250 | 18,127 |
| 100% joint and survivor | 2,935 | 61,173,130 | 20,843 |
| 5-year certain and life | 144 | 1,584,272 | 11,002 |
| 10-year certain and life | 160 | 1,773,398 | 11,084 |
| Survivor beneficiary | 2,501 | 31,904,311 | 12,757 |
| Total | 16,691 | 271,405,064 | 16,261 |
| **Disability retirement** | 4 | 14,640 | 3,660 |
| **Death-in-service** | 1,458 | 16,765,144 | 11,499 |
| Grand totals | 18,153 | $288,184,848 | $15,875 |

## MSEP 2000

| Type of Benefit | Number | Annual Benefits | Average Annual Benefits |
|---|---|---|---|
| **Service retirement** | | | |
| Life annuity | 15,975 | $224,376,119 | $14,045 |
| 50% joint and survivor | 3,855 | 76,033,837 | 19,723 |
| 100% joint and survivor | 4,424 | 70,439,754 | 15,922 |
| 5-year certain and life | 26 | 378,402 | 14,554 |
| 10-year certain and life | 736 | 7,436,891 | 10,104 |
| 15-year certain and life | 593 | 4,974,231 | 8,388 |
| Survivor beneficiary | 866 | 8,175,375 | 9,440 |
| Total | 26,475 | 391,814,609 | 14,799 |
| **Death-in-service** | 199 | 799,746 | 4,019 |
| Grand totals | 26,674 | $392,614,355 | $14,719 |

## Judicial Plan

| Type of Benefit | Number | Annual Benefits | Average Annual Benefits |
|---|---|---|---|
| **Service retirement** | | | |
| Life annuity | 4 | $ 309,852 | $77,463 |
| 50% joint and survivor | 388 | 27,542,406 | 70,986 |
| 100% joint and survivor | 1 | 10,560 | 10,560 |
| Survivor beneficiary | 113 | 4,194,177 | 37,117 |
| Total | 506 | 32,056,995 | 63,354 |
| **Death-in-service** | 34 | 1,132,836 | 33,319 |
| Grand totals | 540 | $33,189,831 | $61,463 |

## Average Monthly Benefit Amounts | Ten Years Ended June 30, 2016

### MSEP

| Members Retiring During Fiscal Year | | Years Credited Service by Category <5 | 5-10 | 11-15 | 16-20 | 21-25 | 26-30 | 31+ | All Members |
|---|---|---|---|---|---|---|---|---|---|
| 2007 | Average monthly benefit | $ 150 | $ 277 | $ 482 | $ 685 | $ 1,132 | $ 1,572 | $ 1,849 | $ 961 |
| | Average final average salary | $ 2,613 | $ 2,360 | $ 2,533 | $ 2,616 | $ 2,993 | $ 3,324 | $ 3,428 | $ 2,854 |
| | Number of retirees | 1 | 388 | 285 | 296 | 311 | 420 | 197 | 1,898 |
| 2008 | Average monthly benefit | $ 0 | $ 265 | $ 474 | $ 732 | $ 1,114 | $ 1,598 | $ 2,035 | $ 949 |
| | Average final average salary | $ 0 | $ 2,366 | $ 2,456 | $ 2,804 | $ 2,971 | $ 3,388 | $ 3,673 | $ 2,877 |
| | Number of retirees | 0 | 366 | 361 | 300 | 323 | 361 | 183 | 1,894 |
| 2009 | Average monthly benefit | $ 0 | $ 291 | $ 491 | $ 750 | $ 1,262 | $ 1,650 | $ 2,166 | $ 988 |
| | Average final average salary | $ 0 | $ 2,418 | $ 2,462 | $ 2,873 | $ 3,288 | $ 3,488 | $ 3,931 | $ 2,984 |
| | Number of retirees | 0 | 424 | 352 | 292 | 382 | 367 | 163 | 1,980 |
| 2010 | Average monthly benefit | $ 569 | $ 286 | $ 509 | $ 780 | $ 1,194 | $ 1,607 | $ 2,120 | $ 953 |
| | Average final average salary | $ 6,867 | $ 2,529 | $ 2,599 | $ 2,885 | $ 3,188 | $ 3,495 | $ 3,826 | $ 2,998 |
| | Number of retirees | 3 | 450 | 412 | 324 | 347 | 324 | 210 | 2,070 |
| 2011 | Average monthly benefit | $ 39 | $ 335 | $ 505 | $ 822 | $ 1,226 | $ 1,659 | $ 2,116 | $ 1,017 |
| | Average final average salary | $ 925 | $ 2,629 | $ 2,528 | $ 3,051 | $ 3,235 | $ 3,534 | $ 3,847 | $ 3,069 |
| | Number of retirees | 3 | 556 | 464 | 414 | 463 | 476 | 270 | 2,646 |
| 2012 | Average monthly benefit | $ 139 | $ 306 | $ 524 | $ 830 | $ 1,234 | $ 1,643 | $ 2,267 | $ 950 |
| | Average final average salary | $ 8,932 | $ 2,572 | $ 2,668 | $ 3,073 | $ 3,289 | $ 3,528 | $ 4,098 | $ 3,070 |
| | Number of retirees | 4 | 555 | 504 | 388 | 443 | 358 | 189 | 2,441 |
| 2013 | Average monthly benefit | $ 251 | $ 326 | $ 524 | $ 753 | $ 1,246 | $ 1,699 | $ 2,005 | $ 932 |
| | Average final average salary | $ 3,744 | $ 2,667 | $ 2,592 | $ 2,814 | $ 3,319 | $ 3,637 | $ 3,664 | $ 3,014 |
| | Number of retirees | 5 | 578 | 532 | 371 | 428 | 378 | 199 | 2,491 |
| 2014 | Average monthly benefit | $ 280 | $ 311 | $ 518 | $ 806 | $ 1,197 | $ 1,693 | $ 2,211 | $ 943 |
| | Average final average salary | $ 4,426 | $ 2,689 | $ 2,611 | $ 3,016 | $ 3,225 | $ 3,653 | $ 4,007 | $ 3,072 |
| | Number of retirees | 5 | 616 | 490 | 361 | 428 | 387 | 198 | 2,485 |
| 2015 | Average monthly benefit | $ 219 | $ 314 | $ 523 | $ 799 | $ 1,271 | $ 1,723 | $ 2,217 | $ 998 |
| | Average final average salary | $ 5,058 | $ 2,597 | $ 2,627 | $ 2,952 | $ 3,424 | $ 3,726 | $ 4,016 | $ 3,120 |
| | Number of retirees | 6 | 641 | 514 | 433 | 443 | 481 | 250 | 2,768 |
| 2016 | Average monthly benefit | $ 151 | $ 307 | $ 506 | $ 819 | $ 1,300 | $ 1,838 | $ 2,360 | $ 1,016 |
| | Average final average salary | $ 3,284 | $ 2,623 | $ 2,600 | $ 3,020 | $ 3,445 | $ 3,968 | $ 4,204 | $ 3,175 |
| | Number of retirees | 6 | 611 | 502 | 430 | 505 | 423 | 215 | 2,692 |
| Ten Years Ended June 30, 2016 | | | | | | | | | |
| | Average monthly benefit | $ 224 | $ 305 | $ 508 | $ 783 | $ 1,225 | $ 1,672 | $ 2,138 | $ 973 |
| | Average final average salary | $ 4,625 | $ 2,565 | $ 2,577 | $ 2,925 | $ 3,257 | $ 3,581 | $ 3,874 | $ 3,035 |
| | Number of retirees | 33 | 5,185 | 4,416 | 3,609 | 4,073 | 3,975 | 2,074 | 23,365 |

*Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.*

## **Average Monthly Benefit Amounts** | Ten Years Ended June 30, 2016

### General Employees in the MSEP*

| Members Retiring During Fiscal Year | | <5 | 5-10 | 11-15 | 16-20 | 21-25 | 26-30 | 31+ | All Members |
|---|---|---|---|---|---|---|---|---|---|
| | | Years Credited Service by Category | | | | | | | |
| 2007 | Average monthly benefit | $ 0 | $ 260 | $ 476 | $ 681 | $ 1,132 | $ 1,567 | $ 1,849 | $ 960 |
| | Average final average salary | $ 0 | $ 2,342 | $ 2,530 | $ 2,615 | $ 2,993 | $ 3,325 | $ 3,428 | $ 2,853 |
| | Number of retirees | 0 | 377 | 283 | 295 | 311 | 419 | 197 | 1,882 |
| 2008 | Average monthly benefit | $ 0 | $ 260 | $ 460 | $ 722 | $ 1,114 | $ 1,598 | $ 2,035 | $ 946 |
| | Average final average salary | $ 0 | $ 2,361 | $ 2,444 | $ 2,787 | $ 2,971 | $ 3,388 | $ 3,673 | $ 2,873 |
| | Number of retirees | 0 | 363 | 356 | 299 | 323 | 361 | 183 | 1,885 |
| 2009 | Average monthly benefit | $ 0 | $ 266 | $ 470 | $ 746 | $ 1,244 | $ 1,650 | $ 2,148 | $ 978 |
| | Average final average salary | $ 0 | $ 2,385 | $ 2,437 | $ 2,873 | $ 3,262 | $ 3,488 | $ 3,906 | $ 2,969 |
| | Number of retirees | 0 | 411 | 348 | 291 | 379 | 367 | 162 | 1,958 |
| 2010 | Average monthly benefit | $ 442 | $ 282 | $ 495 | $ 775 | $ 1,194 | $ 1,602 | $ 2,093 | $ 946 |
| | Average final average salary | $ 6,215 | $ 2,526 | $ 2,582 | $ 2,885 | $ 3,188 | $ 3,497 | $ 3,794 | $ 2,989 |
| | Number of retirees | 2 | 447 | 409 | 323 | 347 | 323 | 208 | 2,059 |
| 2011 | Average monthly benefit | $ 39 | $ 302 | $ 484 | $ 809 | $ 1,223 | $ 1,650 | $ 2,098 | $ 1,007 |
| | Average final average salary | $ 925 | $ 2,611 | $ 2,506 | $ 3,039 | $ 3,236 | $ 3,529 | $ 3,824 | $ 3,061 |
| | Number of retirees | 3 | 530 | 457 | 411 | 462 | 473 | 268 | 2,604 |
| 2012 | Average monthly benefit | $ 139 | $ 292 | $ 507 | $ 817 | $ 1,234 | $ 1,636 | $ 2,267 | $ 943 |
| | Average final average salary | $ 8,932 | $ 2,555 | $ 2,645 | $ 3,059 | $ 3,289 | $ 3,514 | $ 4,098 | $ 3,060 |
| | Number of retirees | 4 | 547 | 500 | 385 | 443 | 357 | 189 | 2,425 |
| 2013 | Average monthly benefit | $ 169 | $ 302 | $ 503 | $ 746 | $ 1,239 | $ 1,699 | $ 1,993 | $ 926 |
| | Average final average salary | $ 4,244 | $ 2,656 | $ 2,571 | $ 2,813 | $ 3,307 | $ 3,637 | $ 3,638 | $ 3,007 |
| | Number of retirees | 3 | 554 | 525 | 369 | 427 | 378 | 198 | 2,454 |
| 2014 | Average monthly benefit | $ 262 | $ 300 | $ 511 | $ 799 | $ 1,193 | $ 1,693 | $ 2,211 | $ 940 |
| | Average final average salary | $ 5,382 | $ 2,677 | $ 2,609 | $ 3,016 | $ 3,226 | $ 3,653 | $ 4,007 | $ 3,071 |
| | Number of retirees | 3 | 609 | 486 | 359 | 427 | 387 | 198 | 2,469 |
| 2015 | Average monthly benefit | $ 219 | $ 300 | $ 518 | $ 784 | $ 1,271 | $ 1,723 | $ 2,208 | $ 994 |
| | Average final average salary | $ 5,058 | $ 2,582 | $ 2,626 | $ 2,945 | $ 3,424 | $ 3,726 | $ 4,007 | $ 3,117 |
| | Number of retirees | 6 | 630 | 512 | 429 | 443 | 481 | 249 | 2,750 |
| 2016 | Average monthly benefit | $ 151 | $ 297 | $ 506 | $ 819 | $ 1,285 | $ 1,838 | $ 2,343 | $ 1,011 |
| | Average final average salary | $ 3,284 | $ 2,617 | $ 2,600 | $ 3,020 | $ 3,420 | $ 3,968 | $ 4,184 | $ 3,168 |
| | Number of retirees | 6 | 603 | 502 | 430 | 502 | 423 | 213 | 2,679 |
| Ten Years Ended June 30, 2016 | | | | | | | | | |
| | Average monthly benefit | $ 188 | $ 289 | $ 496 | $ 775 | $ 1,219 | $ 1,669 | $ 2,127 | $ 967 |
| | Average final average salary | $ 4,810 | $ 2,551 | $ 2,564 | $ 2,919 | $ 3,250 | $ 3,580 | $ 3,860 | $ 3,029 |
| | Number of retirees | 27 | 5,071 | 4,378 | 3,591 | 4,064 | 3,969 | 2,065 | 23,165 |

** Excludes legislators, elected officials, water patrol, and administrative law judges.*
*Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.*

## **Average Monthly Benefit Amounts** | Ten Years Ended June 30, 2016

### Legislators in the MSEP

| Members Retiring During Fiscal Year | | Years Credited Service by Category <5 | 5-10 | 11-15 | 16-20 | 21-25 | 26-30 | 31+ | All Members |
|---|---|---|---|---|---|---|---|---|---|
| 2007 | Average monthly benefit | $ 150 | $ 873 | $ 1,306 | $ 1,959 | $ 0 | $ 3,484 | $ 0 | $ 1,113 |
| | Average final average salary | $ 2,613 | $ 2,993 | $ 2,993 | $ 2,993 | $ 0 | $ 2,993 | $ 0 | $ 2,969 |
| | Number of retirees | 1 | 11 | 2 | 1 | 0 | 1 | 0 | 16 |
| 2008 | Average monthly benefit | $ 0 | $ 871 | $ 1,306 | $ 0 | $ 0 | $ 0 | $ 0 | $ 1,045 |
| | Average final average salary | $ 0 | $ 2,993 | $ 2,993 | $ 0 | $ 0 | $ 0 | $ 0 | $ 2,993 |
| | Number of retirees | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 5 |
| 2009 | Average monthly benefit | $ 0 | $ 903 | $ 1,496 | $ 1,995 | $ 2,395 | $ 0 | $ 0 | $ 1,160 |
| | Average final average salary | $ 0 | $ 2,993 | $ 2,993 | $ 2,993 | $ 2,993 | $ 0 | $ 0 | $ 2,993 |
| | Number of retirees | 0 | 12 | 3 | 1 | 1 | 0 | 0 | 17 |
| 2010 | Average monthly benefit | $ 0 | $ 876 | $ 1,496 | $ 2,245 | $ 0 | $ 3,242 | $ 0 | $ 1,602 |
| | Average final average salary | $ 0 | $ 2,993 | $ 2,993 | $ 2,993 | $ 0 | $ 2,993 | $ 0 | $ 2,993 |
| | Number of retirees | 0 | 3 | 1 | 1 | 0 | 1 | 0 | 6 |
| 2011 | Average monthly benefit | $ 0 | $ 1,000 | $ 1,512 | $ 1,797 | $ 2,744 | $ 3,242 | $ 0 | $ 1,224 |
| | Average final average salary | $ 0 | $ 2,993 | $ 2,993 | $ 2,993 | $ 2,993 | $ 2,993 | $ 0 | $ 2,993 |
| | Number of retirees | 0 | 26 | 4 | 2 | 1 | 1 | 0 | 34 |
| 2012 | Average monthly benefit | $ 0 | $ 1,069 | $ 1,621 | $ 2,225 | $ 0 | $ 0 | $ 0 | $ 1,295 |
| | Average final average salary | $ 0 | $ 2,993 | $ 2,993 | $ 2,993 | $ 0 | $ 0 | $ 0 | $ 2,993 |
| | Number of retirees | 0 | 7 | 2 | 1 | 0 | 0 | 0 | 10 |
| 2013 | Average monthly benefit | $ 374 | $ 910 | $ 1,513 | $ 2,120 | $ 0 | $ 0 | $ 0 | $ 1,046 |
| | Average final average salary | $ 2,993 | $ 2,993 | $ 2,993 | $ 2,993 | $ 0 | $ 0 | $ 0 | $ 2,993 |
| | Number of retirees | 2 | 23 | 5 | 2 | 0 | 0 | 0 | 32 |
| 2014 | Average monthly benefit | $ 307 | $ 1,044 | $ 1,496 | $ 1,995 | $ 2,744 | $ 0 | $ 0 | $ 1,293 |
| | Average final average salary | $ 2,993 | $ 2,993 | $ 2,993 | $ 2,993 | $ 2,993 | $ 0 | $ 0 | $ 2,993 |
| | Number of retirees | 2 | 6 | 3 | 2 | 1 | 0 | 0 | 14 |
| 2015 | Average monthly benefit | $ 0 | $ 977 | $ 1,735 | $ 2,162 | $ 0 | $ 0 | $ 0 | $ 1,315 |
| | Average final average salary | $ 0 | $ 2,993 | $ 2,993 | $ 2,993 | $ 0 | $ 0 | $ 0 | $ 2,993 |
| | Number of retirees | 0 | 10 | 2 | 3 | 0 | 0 | 0 | 15 |
| 2016 | Average monthly benefit | $ 0 | $ 1,048 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 1,048 |
| | Average final average salary | $ 0 | $ 2,993 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 2,993 |
| | Number of retirees | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 7 |
| Ten Years Ended June 30, 2016 | | | | | | | | | |
| | Average monthly benefit | $ 302 | $ 958 | $ 1,501 | $ 2,056 | $ 2,628 | $ 3,323 | $ 0 | $ 1,190 |
| | Average final average salary | $ 2,917 | $ 2,993 | $ 2,993 | $ 2,993 | $ 2,993 | $ 2,993 | $ 0 | $ 2,991 |
| | Number of retirees | 5 | 108 | 24 | 13 | 3 | 3 | 0 | 156 |

*Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.*

## **Average Monthly Benefit Amounts** | Ten Years Ended June 30, 2016

### Elected Officials in the MSEP

| Members Retiring During Fiscal Year | | Years Credited Service by Category <5 | 5-10 | 11-15 | 16-20 | 21-25 | 26-30 | 31+ | All Members |
|---|---|---|---|---|---|---|---|---|---|
| 2007 | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008 | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009 | Average monthly benefit | $ 0 | $ 3,336 | $ 4,852 | $ 0 | $ 0 | $ 0 | $ 0 | $ 4,094 |
| | Average final average salary | $ 0 | $ 8,979 | $ 9,703 | $ 0 | $ 0 | $ 0 | $ 0 | $ 9,341 |
| | Number of retirees | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| 2010 | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2011 | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2012 | Average monthly benefit | $ 0 | $ 0 | $ 3,781 | $ 0 | $ 0 | $ 0 | $ 0 | $ 3,781 |
| | Average final average salary | $ 0 | $ 0 | $ 8,093 | $ 0 | $ 0 | $ 0 | $ 0 | $ 8,093 |
| | Number of retirees | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| 2013 | Average monthly benefit | $ 0 | $ 0 | $ 4,489 | $ 0 | $ 0 | $ 0 | $ 0 | $ 4,489 |
| | Average final average salary | $ 0 | $ 0 | $ 8,979 | $ 0 | $ 0 | $ 0 | $ 0 | $ 8,979 |
| | Number of retirees | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 2014 | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2015 | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2016 | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ten Years Ended June 30, 2016 | | | | | | | | | |
| | Average monthly benefit | $ 0 | $ 3,336 | $ 4,226 | $ 0 | $ 0 | $ 0 | $ 0 | $ 4,048 |
| | Average final average salary | $ 0 | $ 8,979 | $ 8,717 | $ 0 | $ 0 | $ 0 | $ 0 | $ 8,769 |
| | Number of retirees | 0 | 1 | 4 | 0 | 0 | 0 | 0 | 5 |

*Note: COLA increases are excluded from the above for comparison purposes.*

## **Average Monthly Benefit Amounts** | Ten Years Ended June 30, 2016

### Uniformed Water Patrol in the MSEP

| Members Retiring During Fiscal Year | | <5 | 5-10 | 11-15 | 16-20 | 21-25 | 26-30 | 31+ | All Members |
|---|---|---|---|---|---|---|---|---|---|
| | | Years Credited Service by Category | | | | | | | |
| | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| 2007 | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Average monthly benefit | $ 0 | $ 0 | $ 750 | $ 0 | $ 0 | $ 0 | $ 0 | $ 750 |
| 2008 | Average final average salary | $ 0 | $ 0 | $ 2,541 | $ 0 | $ 0 | $ 0 | $ 0 | $ 2,541 |
| | Number of retirees | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 5,113 | $ 5,113 |
| 2009 | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 7,902 | $ 7,902 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 4,886 | $ 4,886 |
| 2010 | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 7,184 | $ 7,184 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| | Average monthly benefit | $ 0 | $ 0 | $ 721 | $ 0 | $ 0 | $ 3,086 | $ 4,553 | $ 3,200 |
| 2011 | Average final average salary | $ 0 | $ 0 | $ 2,964 | $ 0 | $ 0 | $ 5,077 | $ 6,912 | $ 5,388 |
| | Number of retirees | 0 | 0 | 1 | 0 | 0 | 2 | 2 | 5 |
| | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 959 | $ 0 | $ 0 | $ 0 | $ 959 |
| 2012 | Average final average salary | $ 0 | $ 0 | $ 0 | $ 2,794 | $ 0 | $ 0 | $ 0 | $ 2,794 |
| | Number of retirees | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | Average monthly benefit | $ 0 | $ 69 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 69 |
| 2013 | Average final average salary | $ 0 | $ 1,291 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 1,291 |
| | Number of retirees | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Average monthly benefit | $ 0 | $ 0 | $ 780 | $ 0 | $ 0 | $ 0 | $ 0 | $ 780 |
| 2014 | Average final average salary | $ 0 | $ 0 | $ 2,507 | $ 0 | $ 0 | $ 0 | $ 0 | $ 2,507 |
| | Number of retirees | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 4,539 | $ 4,539 |
| 2015 | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 6,321 | $ 6,321 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 4,221 | $ 4,221 |
| 2016 | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 6,375 | $ 6,375 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| Ten Years Ended June 30, 2016 | | | | | | | | | |
| | Average monthly benefit | $ 0 | $ 69 | $ 750 | $ 959 | $ 0 | $ 3,086 | $ 4,622 | $ 3,095 |
| | Average final average salary | $ 0 | $ 1,291 | $ 2,671 | $ 2,794 | $ 0 | $ 5,077 | $ 6,896 | $ 5,161 |
| | Number of retirees | 0 | 1 | 3 | 1 | 0 | 2 | 8 | 15 |

*Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.*

# **Average Monthly Benefit Amounts** | Ten Years Ended June 30, 2016

## Administrative Law Judges and Legal Advisors in the MSEP

| Members Retiring During Fiscal Year | | Years Credited Service by Category <5 | 5-10 | 11-15 | 16-20 | 21-25 | 26-30 | 31+ | All Members |
|---|---|---|---|---|---|---|---|---|---|
| 2007 | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| | Number of retirees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2008 | Average monthly benefit | $ 0 | $ 0 | $ 2,040 | $ 3,843 | $ 0 | $ 0 | $ 0 | $ 2,641 |
| | Average final average salary | $ 0 | $ 0 | $ 4,081 | $ 7,936 | $ 0 | $ 0 | $ 0 | $ 5,366 |
| | Number of retirees | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 3 |
| 2009 | Average monthly benefit | $ 0 | $ 0 | $ 0 | $ 0 | $ 4,200 | $ 0 | $ 0 | $ 4,200 |
| | Average final average salary | $ 0 | $ 0 | $ 0 | $ 0 | $ 8,400 | $ 0 | $ 0 | $ 8,400 |
| | Number of retirees | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| 2010 | Average monthly benefit | $ 823 | $ 0 | $ 2,827 | $ 0 | $ 0 | $ 0 | $ 0 | $ 2,159 |
| | Average final average salary | $ 8,172 | $ 0 | $ 5,851 | $ 0 | $ 0 | $ 0 | $ 0 | $ 6,625 |
| | Number of retirees | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 3 |
| 2011 | Average monthly benefit | $ 0 | $ 0 | $ 3,236 | $ 4,101 | $ 0 | $ 0 | $ 0 | $ 3,524 |
| | Average final average salary | $ 0 | $ 0 | $ 6,433 | $ 8,202 | $ 0 | $ 0 | $ 0 | $ 7,023 |
| | Number of retirees | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 3 |
| 2012 | Average monthly benefit | $ 0 | $ 2,493 | $ 0 | $ 4,378 | $ 0 | $ 4,204 | $ 0 | $ 3,692 |
| | Average final average salary | $ 0 | $ 8,756 | $ 0 | $ 8,756 | $ 0 | $ 8,408 | $ 0 | $ 8,640 |
| | Number of retirees | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 3 |
| 2013 | Average monthly benefit | $ 0 | $ 0 | $ 2,657 | $ 0 | $ 4,134 | $ 0 | $ 4,450 | $ 3,747 |
| | Average final average salary | $ 0 | $ 0 | $ 5,314 | $ 0 | $ 8,267 | $ 0 | $ 8,900 | $ 7,494 |
| | Number of retirees | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 3 |
| 2014 | Average monthly benefit | $ 0 | $ 2,433 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 2,433 |
| | Average final average salary | $ 0 | $ 8,146 | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 | $ 8,146 |
| | Number of retirees | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 2015 | Average monthly benefit | $ 0 | $ 2,259 | $ 0 | $ 3,012 | $ 0 | $ 0 | $ 0 | $ 2,636 |
| | Average final average salary | $ 0 | $ 7,936 | $ 0 | $ 6,023 | $ 0 | $ 0 | $ 0 | $ 6,980 |
| | Number of retirees | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 |
| 2016 | Average monthly benefit | $ 0 | $ 853 | $ 0 | $ 0 | $ 3,811 | $ 0 | $ 0 | $ 3,072 |
| | Average final average salary | $ 0 | $ 3,508 | $ 0 | $ 0 | $ 7,623 | $ 0 | $ 0 | $ 6,594 |
| | Number of retirees | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 4 |
| Ten Years Ended June 30, 2016 | | | | | | | | | |
| | Average monthly benefit | $ 823 | $ 2,010 | $ 2,695 | $ 3,834 | $ 3,995 | $ 4,204 | $ 4,450 | $ 3,153 |
| | Average final average salary | $ 8,172 | $ 7,087 | $ 5,435 | $ 7,729 | $ 7,989 | $ 8,408 | $ 8,900 | $ 7,113 |
| | Number of retirees | 1 | 4 | 7 | 4 | 6 | 1 | 1 | 24 |

*Note: COLA increases are excluded from the above for comparison purposes.*

## **Average Monthly Benefit Amounts** | Ten Years Ended June 30, 2016

### Judicial Plan

| Members Retiring During Fiscal Year | | Years Credited Service by Category <5 | 5-10 | 11-15 | 16-20 | 21-25 | 26-30 | 31+ | All Members |
|---|---|---|---|---|---|---|---|---|---|
| 2007 | Average monthly benefit | $ 375 | $ 2,121 | $ 3,995 | $ 4,243 | $ 4,390 | $ 4,083 | $ 4,167 | $ 3,842 |
| | Average final average salary | $ 9,000 | $ 7,889 | $ 7,990 | $ 8,486 | $ 8,833 | $ 8,167 | $ 8,333 | $ 8,355 |
| | Number of retirees | 1 | 5 | 5 | 14 | 6 | 6 | 3 | 40 |
| 2008 | Average monthly benefit | $ 381 | $ 2,045 | $ 4,120 | $ 4,805 | $ 5,132 | $ 4,593 | $ 5,186 | $ 4,033 |
| | Average final average salary | $ 2,742 | $ 6,203 | $ 8,276 | $ 9,611 | $ 10,264 | $ 9,186 | $ 10,373 | $ 8,445 |
| | Number of retirees | 1 | 2 | 6 | 2 | 3 | 2 | 1 | 17 |
| 2009 | Average monthly benefit | $ 524 | $ 1,786 | $ 3,663 | $ 4,693 | $ 5,286 | $ 5,342 | $ 5,020 | $ 3,336 |
| | Average final average salary | $ 6,103 | $ 7,469 | $ 7,811 | $ 9,336 | $ 10,572 | $ 10,684 | $ 10,040 | $ 8,257 |
| | Number of retirees | 6 | 2 | 7 | 6 | 3 | 1 | 1 | 26 |
| 2010 | Average monthly benefit | $ 458 | $ 1,333 | $ 4,507 | $ 4,557 | $ 0 | $ 5,342 | $ 4,973 | $ 3,958 |
| | Average final average salary | $ 6,597 | $ 8,000 | $ 9,577 | $ 9,114 | $ 0 | $ 10,684 | $ 9,946 | $ 9,265 |
| | Number of retirees | 1 | 1 | 2 | 1 | 0 | 1 | 3 | 9 |
| 2011 | Average monthly benefit | $ 0 | $ 2,188 | $ 4,631 | $ 4,542 | $ 4,869 | $ 4,789 | $ 4,650 | $ 4,343 |
| | Average final average salary | $ 0 | $ 7,994 | $ 9,322 | $ 9,031 | $ 9,738 | $ 9,577 | $ 9,299 | $ 9,139 |
| | Number of retirees | 0 | 4 | 8 | 9 | 4 | 2 | 5 | 32 |
| 2012 | Average monthly benefit | $ 0 | $ 2,353 | $ 4,561 | $ 4,621 | $ 0 | $ 5,020 | $ 0 | $ 3,822 |
| | Average final average salary | $ 0 | $ 7,797 | $ 10,179 | $ 9,241 | $ 0 | $ 10,040 | $ 0 | $ 9,050 |
| | Number of retirees | 0 | 5 | 4 | 4 | 0 | 1 | 0 | 14 |
| 2013 | Average monthly benefit | $ 0 | $ 2,777 | $ 4,234 | $ 4,625 | $ 5,444 | $ 5,452 | $ 5,293 | $ 4,832 |
| | Average final average salary | $ 0 | $ 8,246 | $ 8,696 | $ 9,251 | $ 10,888 | $ 10,904 | $ 10,585 | $ 9,848 |
| | Number of retirees | 0 | 1 | 6 | 4 | 5 | 4 | 2 | 22 |
| 2014 | Average monthly benefit | $ 0 | $ 2,310 | $ 4,571 | $ 5,151 | $ 5,117 | $ 4,869 | $ 5,293 | $ 4,313 |
| | Average final average salary | $ 0 | $ 8,259 | $ 9,143 | $ 10,303 | $ 10,233 | $ 9,738 | $ 10,585 | $ 9,435 |
| | Number of retirees | 0 | 4 | 6 | 3 | 3 | 1 | 1 | 18 |
| 2015 | Average monthly benefit | $ 1,114 | $ 3,140 | $ 5,572 | $ 5,572 | $ 5,970 | $ 5,572 | $ 5,848 | $ 5,392 |
| | Average final average salary | $ 11,143 | $ 9,419 | $ 11,143 | $ 11,143 | $ 11,940 | $ 11,143 | $ 11,697 | $ 11,253 |
| | Number of retirees | 1 | 3 | 7 | 10 | 7 | 4 | 7 | 39 |
| 2016 | Average monthly benefit | $ 0 | $ 4,193 | $ 5,575 | $ 5,452 | $ 6,166 | $ 5,844 | $ 0 | $ 5,545 |
| | Average final average salary | $ 0 | $ 11,688 | $ 11,503 | $ 10,903 | $ 12,332 | $ 11,688 | $ 0 | $ 11,569 |
| | Number of retirees | 0 | 2 | 3 | 5 | 4 | 2 | 0 | 16 |
| Ten Years Ended June 30, 2016 | | | | | | | | | |
| | Average monthly benefit | $ 547 | $ 2,412 | $ 4,504 | $ 4,793 | $ 5,317 | $ 4,984 | $ 5,117 | $ 4,378 |
| | Average final average salary | $ 6,610 | $ 8,230 | $ 9,227 | $ 9,573 | $ 10,643 | $ 9,968 | $ 10,234 | $ 9,465 |
| | Number of retirees | 10 | 29 | 54 | 58 | 35 | 24 | 23 | 233 |

*Note: COLA increases are excluded from the above for comparison purposes.*

## Retirees and Beneficiaries
## Tabulated by Fiscal Year of Retirement | As of June 30, 2016

### MSEP

| Fiscal Year of Retirement | Number | Total Annual Benefit | Average Monthly Benefit |
|---|---|---|---|
| 1974 | 2 | $ 10,546 | $ 439 |
| 1975 | 1 | 891 | 74 |
| 1976 | 5 | 20,482 | 341 |
| 1977 | 8 | 82,131 | 856 |
| 1978 | 13 | 67,525 | 433 |
| 1979 | 13 | 78,766 | 505 |
| 1980 | 14 | 104,837 | 624 |
| 1981 | 30 | 278,289 | 773 |
| 1982 | 32 | 298,120 | 776 |
| 1983 | 30 | 353,533 | 982 |
| 1984 | 56 | 537,258 | 799 |
| 1985 | 83 | 855,918 | 859 |
| 1986 | 115 | 1,123,481 | 814 |
| 1987 | 136 | 1,562,085 | 957 |
| 1988 | 182 | 2,507,977 | 1,148 |
| 1989 | 227 | 3,639,992 | 1,336 |
| 1990 | 232 | 3,357,466 | 1,206 |
| 1991 | 329 | 5,819,546 | 1,474 |
| 1992 | 358 | 5,728,326 | 1,333 |
| 1993 | 482 | 7,820,705 | 1,352 |
| 1994 | 463 | 7,760,784 | 1,397 |
| 1995 | 639 | 11,137,216 | 1,452 |
| 1996 | 676 | 12,297,511 | 1,516 |
| 1997 | 708 | 12,639,955 | 1,488 |
| 1998 | 860 | 15,824,127 | 1,533 |
| 1999 | 977 | 18,195,163 | 1,552 |
| 2000 | 1,073 | 19,830,992 | 1,540 |
| 2001 | 2,151 | 38,777,591 | 1,502 |
| 2002 | 1,519 | 23,898,465 | 1,311 |
| 2003 | 1,636 | 27,146,333 | 1,383 |
| 2004 | 2,209 | 34,987,458 | 1,320 |
| 2005 | 1,611 | 23,545,015 | 1,218 |
| 2006 | 1,795 | 25,070,636 | 1,164 |
| 2007 | 2,114 | 30,632,287 | 1,208 |
| 2008 | 2,131 | 30,358,215 | 1,187 |
| 2009 | 2,238 | 32,192,683 | 1,199 |
| 2010 | 2,331 | 32,617,062 | 1,166 |
| 2011 | 2,971 | 44,013,047 | 1,235 |
| 2012 | 2,768 | 38,447,349 | 1,157 |
| 2013 | 2,872 | 38,802,948 | 1,126 |
| 2014 | 2,895 | 38,983,633 | 1,122 |
| 2015 | 3,218 | 45,885,994 | 1,188 |
| 2016 | 3,135 | 44,933,187 | 1,194 |
| | 45,338 | $682,225,525 | $1,254 |

## Retirees and Beneficiaries
## Tabulated by Fiscal Year of Retirement | As of June 30, 2016

### Judicial Plan

| Fiscal Year of Retirement | Number | Total Annual Benefit | Average Monthly Benefit |
|---|---|---|---|
| 1976 & prior | 1 | $ 11,103 | $ 925 |
| 1977 | 0 | 0 | 0 |
| 1978 | 1 | 15,930 | 1,327 |
| 1979 | 0 | 0 | 0 |
| 1980 | 1 | 21,723 | 1,810 |
| 1981 | 1 | 65,790 | 5,483 |
| 1982 | 0 | 0 | 0 |
| 1983 | 1 | 21,337 | 1,778 |
| 1984 | 1 | 22,678 | 1,890 |
| 1985 | 0 | 0 | 0 |
| 1986 | 1 | 27,240 | 2,270 |
| 1987 | 7 | 347,902 | 4,142 |
| 1988 | 3 | 160,074 | 4,446 |
| 1989 | 6 | 357,990 | 4,972 |
| 1990 | 5 | 266,449 | 4,441 |
| 1991 | 10 | 445,424 | 3,712 |
| 1992 | 4 | 216,049 | 4,501 |
| 1993 | 6 | 264,621 | 3,675 |
| 1994 | 5 | 291,289 | 4,855 |
| 1995 | 13 | 950,813 | 6,095 |
| 1996 | 7 | 322,672 | 3,841 |
| 1997 | 5 | 323,392 | 5,390 |
| 1998 | 19 | 1,170,219 | 5,133 |
| 1999 | 15 | 956,769 | 5,315 |
| 2000 | 16 | 1,085,152 | 5,652 |
| 2001 | 15 | 1,277,151 | 7,095 |
| 2002 | 14 | 993,354 | 5,913 |
| 2003 | 21 | 1,423,159 | 5,647 |
| 2004 | 16 | 1,020,819 | 5,317 |
| 2005 | 15 | 1,150,824 | 6,393 |
| 2006 | 17 | 767,629 | 3,763 |
| 2007 | 53 | 3,225,520 | 5,072 |
| 2008 | 27 | 1,548,986 | 4,781 |
| 2009 | 34 | 1,784,441 | 4,374 |
| 2010 | 14 | 792,127 | 4,715 |
| 2011 | 39 | 2,280,447 | 4,873 |
| 2012 | 20 | 957,865 | 3,991 |
| 2013 | 31 | 1,964,321 | 5,280 |
| 2014 | 24 | 1,362,666 | 4,731 |
| 2015 | 56 | 3,691,554 | 5,493 |
| 2016 | 25 | 1,518,646 | 5,062 |
| | 549 | $33,104,125 | $ 5,025 |

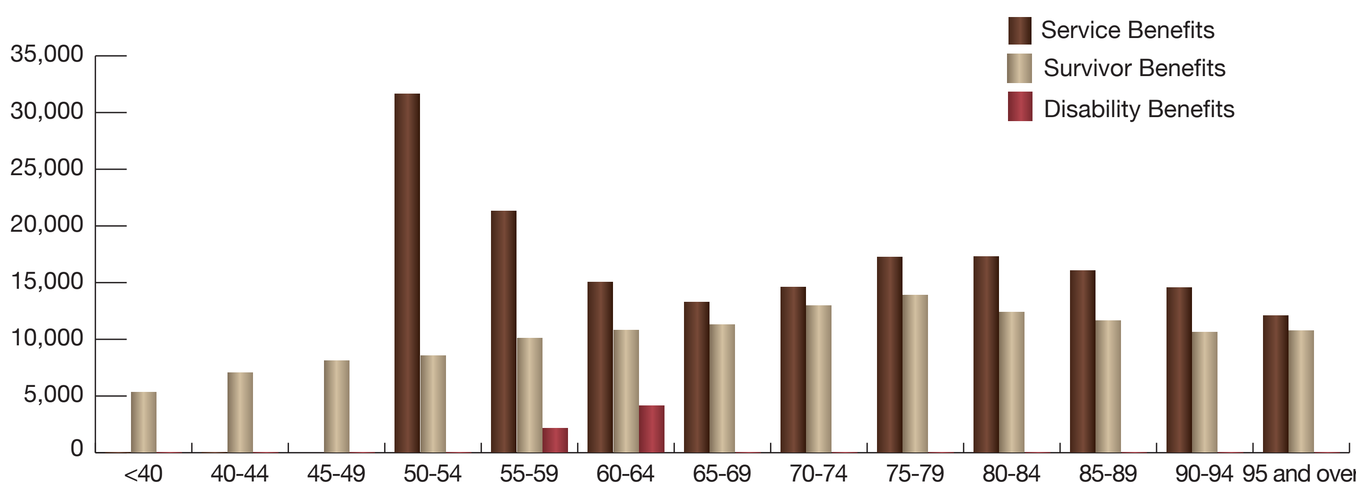
## Total Benefits Payable
## Tabulated by Attained Ages of Benefit Recipients | As of June 30, 2016

### MSEP

| Attained Ages | Service Retirement No. | Service Retirement Annual Benefits | Disability Retirement No. | Disability Retirement Annual Benefits | Survivors and Beneficiaries No. | Survivors and Beneficiaries Annual Benefits | Totals No. | Totals Annual Benefits |
|---|---|---|---|---|---|---|---|---|
| Under 20 | | | | | 73 | $ 247,204 | 73 | $ 247,204 |
| 20-24 | | | | | 14 | 80,398 | 14 | 80,398 |
| 25-29 | | | | | 9 | 88,128 | 9 | 88,128 |
| 30-34 | | | | | 21 | 131,055 | 21 | 131,055 |
| 35-39 | | | | | 40 | 290,137 | 40 | 290,137 |
| 40-44 | | | | | 73 | 516,535 | 73 | 516,535 |
| 45-49 | 5 | $ 150,012 | | | 146 | 1,186,130 | 151 | 1,336,142 |
| 50-54 | 477 | 15,106,270 | | | 213 | 1,825,386 | 690 | 16,931,656 |
| 55-59 | 3,491 | 74,397,774 | 1 | $ 2,184 | 346 | 3,495,483 | 3,838 | 77,895,441 |
| 60-64 | 8,500 | 128,027,998 | 3 | 12,456 | 496 | 5,361,433 | 8,999 | 133,401,887 |
| 65-69 | 10,929 | 145,196,729 | | | 733 | 8,299,051 | 11,662 | 153,495,780 |
| 70-74 | 7,030 | 102,823,394 | | | 668 | 8,685,888 | 7,698 | 111,509,282 |
| 75-79 | 4,393 | 75,781,927 | | | 708 | 9,846,185 | 5,101 | 85,628,112 |
| 80-84 | 2,664 | 46,120,440 | | | 721 | 8,959,210 | 3,385 | 55,079,650 |
| 85-89 | 1,498 | 24,111,937 | | | 494 | 5,763,461 | 1,992 | 29,875,398 |
| 90-94 | 640 | 9,344,076 | | | 221 | 2,356,798 | 861 | 11,700,874 |
| 95 | 56 | 615,580 | | | 16 | 190,392 | 72 | 805,972 |
| 96 | 38 | 451,125 | | | 13 | 97,522 | 51 | 548,647 |
| 97 | 36 | 451,168 | | | 5 | 97,901 | 41 | 549,069 |
| 98 | 12 | 224,904 | | | 7 | 90,864 | 19 | 315,768 |
| 99 | 8 | 107,292 | | | 1 | 19,260 | 9 | 126,552 |
| 100 | 8 | 97,526 | | | 4 | 10,524 | 12 | 108,050 |
| 101 | 4 | 59,904 | | | 2 | 17,760 | 6 | 77,664 |
| 102 | 5 | 45,984 | | | | | 5 | 45,984 |
| 103 | 3 | 11,560 | | | 1 | 3,672 | 4 | 15,232 |
| 104 | 2 | 14,388 | | | | | 2 | 14,388 |
| Totals | 39,799 | $623,139,988 | 4 | $14,640 | 5,025 | $57,660,377 | 44,828 | $680,815,005 |

Average age at retirement: 60.0 years • Average age now: 69.9 years

**MSEP** | Average Annual Benefits




Average benefit paid: $15,657 service benefits • $11,475 survivor benefits • $3,660 disability benefits

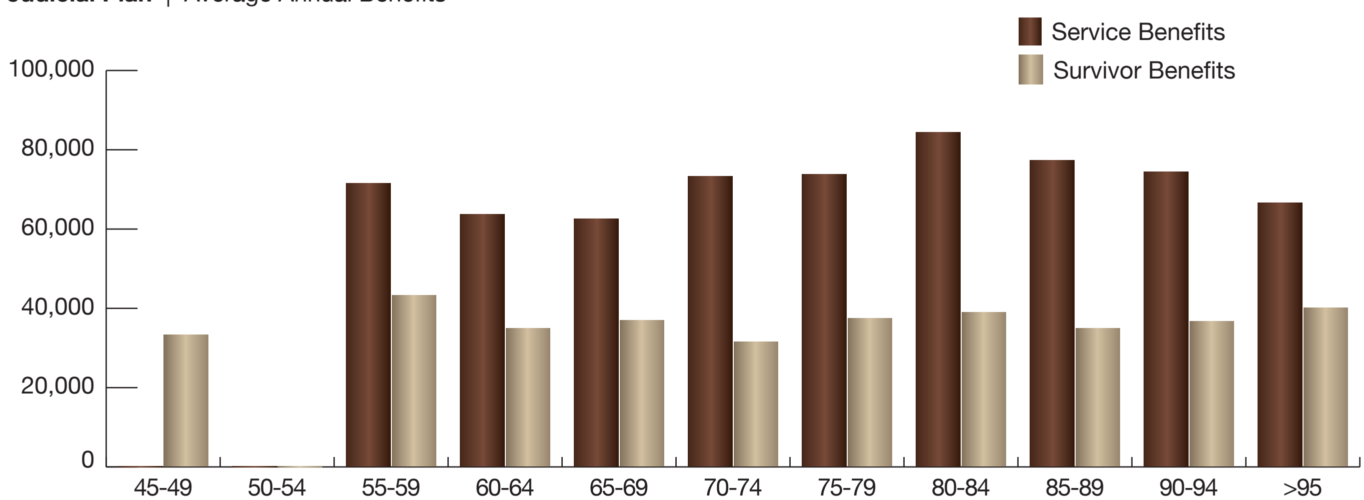
# Total Benefits Payable
## Tabulated by Attained Ages of Benefit Recipients | As of June 30, 2016

### Judicial Plan

| | Service Retirement | | Survivors and Beneficiaries | | Totals | |
|---|---|---|---|---|---|---|
| Attained Ages | No. | Annual Benefits | No. | Annual Benefits | No. | Annual Benefits |
| 45-49 | | | 1 | $ 33,459 | 1 | $ 33,459 |
| 50-54 | | | | | 0 | 0 |
| 55-59 | 3 | $ 214,800 | 4 | 173,256 | 7 | 388,056 |
| 60-64 | 45 | 2,870,353 | 6 | 210,553 | 51 | 3,080,906 |
| 65-69 | 99 | 6,202,139 | 14 | 519,133 | 113 | 6,721,272 |
| 70-74 | 98 | 7,188,006 | 21 | 664,958 | 119 | 7,852,964 |
| 75-79 | 62 | 4,578,381 | 20 | 751,738 | 82 | 5,330,119 |
| 80-84 | 37 | 3,125,271 | 18 | 703,081 | 55 | 3,828,352 |
| 85-89 | 30 | 2,322,313 | 40 | 1,400,933 | 70 | 3,723,246 |
| 90-94 | 12 | 894,780 | 16 | 588,106 | 28 | 1,482,886 |
| 95+ | 7 | 466,776 | 7 | 281,796 | 14 | 748,572 |
| Totals | 393 | $27,862,819 | 147 | $5,327,013 | 540 | $33,189,832 |

Average age at retirement: 65.0 years • Average age now: 74.8 years

**Judicial Plan** | Average Annual Benefits




Average benefit paid: $70,898 service benefits • $36,238 survivor benefits

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